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MR. O. D. COTTON, our representative in the Western and Southern district, has changed his address from No. 35 Wiggins Block, Cincinnati, to No. 26 North High street, Columbus, Ohio.

THE American Society of Mechanical Engineers, the record of whose meeting at Cleveland occupies a part of our space this week, is showing all the evidences of a vigorous growth. The meetings are very well attended, and every one present has the air of meaning business. There are a few in older societies of this class who come to meetings because they want to enjoy the social features, and care little or nothing for the technical matters which come up for consideration. It is probably merely a question of time when the Mechanical Engineers will also count such members in their ranks ; for they will soon, if they go on having, incidentally, such pleasant receptions as the one in Cleveland, acquire a reputation attractive to those who can only prevail upon themselves to attend opening sessions.

It is not a matter to be wondered at that in so young a society there should be some minor defects in the organization and conduct of the meetings. Some of the members will ramble ; but on the whole, the discussions during the meetings of the Society of Mechanical Engineers prove a close attention and are vigorous and well sustained. An admirable system is that of preparing, previous to the meetings, printed slips of the papers, and distributing proofs of accompanying illustrations for reference. It is, of course, possible only when members can be induced to prepare and submit their papers in time to be put into type in advance. On the other hand, this system should make it possible to present only a summary of long papers, with a view to saving time and avoiding the necessity of discriminating between members, by dividing the papers into two classes, those which are actually read and discussed, and those which are condemned to be read "by title." The meetings of the Society of Mechanical Engineers will probably at an early date become models for her sister societies. The society is now launched on the tide of success, and gives promise of fully meeting the most sanguine expectations of its founders.

THE RAILROADS AND HIGH EXPLOSIVES.

The position which the different railroads of the country have taken on the question of carrying high explosives is peculiar in many instances. Some of the greatest lines in the country, the Vanderbilt system, the Erie, the Union Pacific, the Michigan roads, and a considerable number of lines in the West, East, and South, decline to carry high explosives under any circumstances. Some are entirely deaf to arguments, while others cut off all discussion by assuming the position that the profit of the business of carrying explosives does not warrant the risk attending it. Upon the latter point, they adhere to notions once formed, and decline to listen to the most liberal offers to afford them the means of forming an opinion based upon experiments carried out by experts of their own choosing. The manufacturers of high explosives above all others are intensely interested in carefully studying every means of avoiding accidents in transit or in use. They have been prompt and conscientious in carrying out instructions framed by railroad officials with a view to making the carriage of explosives safe ; but honest effort ceases when met with such stolid indifference. They have submitted to what in some cases seemed the inevitable, and have in many instances practically abandoned territory in which they did a good trade.

Roughly, about ten million pounds of high explosives are annually distributed among consumers, much of it being shipped over long distances by rail because the points of consumption are far from the centers of production. In some cases, local works supply the demand of important regions, or water routes give access when communication by rail is cut off. Still, the policy adopted by some of the railroads has undoubtedly a tendency to cut off a considerable portion of the scattered trade, and from the manufacturer's point of view is quite a serious matter. It is not our purpose for the present to discuss the question whether as common carriers the railroads have legally the right to refuse to carry any class of goods without showing better cause for such refusal. They undoubtedly have the right to make and enforce such regulations, within reasonable limits, as will protect their own life and property and that of their patrons. They are justified, too, in charging rates of freight which will compensate them for the risk incurred in carrying dangerous freight. They have freely exercised these privileges. They demand from one and a half to double the rates on first-class freight, and are apparently well content with assuming the risk for that consideration, as they have declined proposals on the part of responsible manufacturers to give bonds to pay any damages inflicted upon property in all but those cases where accidents were due to carelessness on the part of railroads. The consideration for the assumption of the risk by the manufacturers was to be, that the rates of freight be the same as those governing the carriage of any ordinary freight, the classification to be on the same basis.

How unfair is the stand taken by the railroads in peremptorily declining to carry high explosives, may be judged from a glance at the records of accidents due to their transportation. The only two cases we know of are the explosion of a car-load of dynamite at Council Bluffs, where the car in question was one in a burning train. It is a difficult matter to explain the cause of this explosion, when facts are on record showing that large lots of dynamite have been consumed in conflagrations of storehouses and shops without causing an explosion. It is believed that in breaking down, some of the iron-work of the car must have been thrust, in a red-hot condition, into some of the unconsumed explosive. A second more recent case happened at Kittanning, Pa. It appears that two persons were amusing themselves in practicing pistol-shooting, making a freight-car their target. The car happened to be loaded with explosive material, and a stray bullet penetrating into the cases exploded them. It will be conceded that the probability of the occurrence of such a chain of circumstances as those leading to the Kittanning accident is not great, and still such happenings strengthen in the minds of railroad officials and the general public the unreasonable fears in regard to high explosives. They will not bear certain treatment, it is true ; but when handled by men of ordinary intelligence, they are less dangerous than many other substances, and notably black powder. There is as much logic in the proceeding of the refractory railroads in declining, as there would be in the action of a State to the crossing of rivers by railroads on bridges, because occasionally trains will drop through them into the water below.

Until now, the struggle on the question of the carriage of high explosives has been conducted by private conference between the manufacturers and the railroad officials. The consumers, it is true, could have no better champions ; but, after all, it is they who have had to carry the greater part of the burden inflicted upon the article by the restrictions of the railroad companies. They are content to pay the manufacturers a fair profit, and to see the railroad companies compensated for the work and the risk of transportation ; but it is too much to ask them to submit to paying for special methods of carriage or go without high explosives entirely, because a few railroad officials are too timid or too indolent to go into the merits of an important question, and prefer to brush it aside by an arbitrary exercise of power.

THE ROANOKE MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.—II.

The second session of the Roanoke meeting of the Institute of Mining Engineers was held in Rohrer Hall on Wednesday morning, June 6th.

An interesting address was made by Major Jed Hotchkiss, on the Iron Ores of the Virginias West of the Archæan or Eastern Blue Ridge, and on the Coals of the Lower Measures, or Conglomerate Group in the Virginias. The address was illustrated by maps and sections.

The Major talked in his usual entertaining manner. He described at length the different iron ore formations, and mentioned several localities where the ores were in great abundance and of fine quality. He said there was no anthracite coal in Virginia worth a button. He felt obliged to make this emphatic declaration, because Wall Street was all the time starting companies on bogus anthracite coal-beds in this State; and he wanted all the members of the Institute to tell any body who said there was anthracite coal (worth a button) in Virginia that Jed Hotchkiss said it was a lie.

Mr. Edward Gridley, of Wassaic, N. Y., then read a paper on Cast-Iron of Unusual Strength. The iron was made at Wassaic Furnace, Dutchess County, N. Y., from a mixture of two thirds roasted carbonate ore and one third raw carbonate. The tensile strength varied from 39,669 to 47,500 pounds per square inch, with 41,349 as the average of thirteen tests. The roasted carbonate ore contained iron 54·042; manganese, 2·165; and phosphorus, 0·120. The pig-iron was analyzed by Dr. T. M. Drown with the following result: Graphitic carbon, 2·310; combined carbon, 0·780; silicon, 1·307; sulphur, 0·086; phosphorus, 0·294; manganese, 1·512; iron, 93·700; total, 99·989.

Dr. Persifor Frazer read a paper on the Copper Deposits of the South Mountain. He also exhibited a barometer made by Hicks, of London. It was made of aluminium, and was inclosed in a cork case. It was characterized by great lightness, being only about one third the weight of an ordinary barometer.

A paper on the Porosity and Specific Gravity of Coke was then read by Prof. F. P. Dewey, of Washington, D. C.; after which, Mr. E. Gybbon Spilsbury, of Lancaster County, S. C., presented a valuable paper on Gold Mining in South Carolina.

Many of the members afterward visited the Rohrer Iron Company's mines, situated a few miles from Roanoke, where preparations are making to mine on an extensive scale large and valuable deposits of brown hematite iron ore. The Crozer Steel and Iron Company's furnace and the Roanoke Machine-Works were also visited. These latter at present form a most important part of the industrial establishments of Roanoke, and as they are so complete and so convenient in their arrangements and equipments, I give somewhat in detail a description of these works from information kindly furnished by the courteous superintendent, Mr. Charles Blackwell.

ROANOKE MACHINE-WORKS.

Engine-House.—Annular in shape, one half of a circle, or 180 degrees, completed. Radius of outside brick walls, 157 feet. Span of iron, Fink roof-trusses, 64 feet from center to center of pins. The inside wall consists of wrought-iron columns and heavy glazed wooden doors, opening outward. The roof is covered with slate, finished with galvanized iron cornices. There are two principal entrances, one from the Norfolk & Western and another from the Shenandoah Valley Railroad. No doors are required at these, as brick walls carried up to the ridge of the roof completely shut off these passages from the rest of the building, thereby reducing the danger in the event of fire. Twenty pits provide shed room for as many engines. Each pit is provided with a jack for the escape of smoke; and in order to avoid the otherwise frequent renewal, on account of corrosion, that portion of each jack which is above the roof-line is constructed of terra-cotta. One of the pits is supplied with a driving-wheel and truck-wheel hydraulic drop arrangement, for the purpose of facilitating repairs to driving-boxes, and changing of truck-wheels of engines without lifting the engines. The entire shop is floored with two-inch oak plank.

A combined lighting-up furnace and sand-drier is constructed against the outer wall, about the middle of the shop, thus saving the necessity of lighting up engines with wood, and avoiding thereby considerable danger from fire caused by the sparks from the partially consumed wood, and likely to be thrown from the stack or ash-pan while running the first few miles after starting with a train. Each pit has a water-hydrant conveniently placed for the purpose of attachment of hose for washing out and filling up of boilers. On each side-wall of each pit are placed four steam pipes for heating purposes, steam for which purpose is intended to be taken from a stationary engine boiler, at the west end of the machine-shop. Each pit is separately drained into a twelve-inch terra-cotta main drain, and terminating at Lick Run (a small stream in the neighborhood), and provided with two traps for the accumulation and removal of solid matter. The turn-table is placed at the center of the area inclosed within the annular building when completed. It is 75 feet diameter, and of the upper truss type, thus necessitating an extremely shallow pit, the ordinary build of table with deep pit being undesirable, on account of liability to flood from back-water through drains at high stages of the creek. This unusual diameter was decided upon, as the necessity for frogs was thereby obviated and the serious expense of their maintenance and renewal avoided.

A compromise gauge, with two inside guard-rails, suiting both 5 foot and 4 foot 9-inch gauges, is laid on the table, thus serving equally well both the Norfolk & Western and the Shenandoah Valley section of the engine-house. Should necessity arise, the table can be arranged to turn by steam power. About 40 men will be employed in this building.

Smith-Shop.—This is rectangular in shape, 350 feet by 72 feet, with iron roof-trusses, and covered with slate. Additional light and means of escape for smoke are provided by the movable sashes in the louvre, which is 20 feet in width and extends nearly the entire length of the building. It is intended to take the smoke from the various fires by means of two overhead flues to the stack of the machine-shop stationary engine boiler.

Two bolt-forging and heading machines will be used, thus very considerably reducing hand labor. Blast is supplied by a No. 10 Sturtevant blower. Steam-hammer work will also be done in this shop; four steam-hammers of 600, 1100, 1500, and 3000 pounds capacity respectively, and one 3000-pound drop-hammer, being provided. Engine frames and axles will be forged, and truck-bars and other car work shaped, by means of these hammers. Steam for the use of these various hammers is supplied by a continuous pipe leading from the machine-shop boiler at the west end and the two boilers over the two furnaces at the east end. The waste heat from the furnaces is utilized for the purpose of making steam. This shop will employ from 90 to 100 men.

Between smith and machine-shops is located the tube-shop, where tubes will be cleaned, cut, and pieced, the welding being performed by a steam-hammer made expressly for that purpose.

Machine-Shop.—This is rectangular in shape, 381 feet by 72 feet, with iron Fink roof-trusses, and covered with slate. To give additional light and ventilation, movable sashes are placed in the louvre, which extends nearly the whole length of building.

An annex, 28 feet by 19 feet at the northwest corner of this building, contains the stationary engine of 100 horse-power, which drives the machines in this as well as the smith-shop. The engine is of the Hartford Engineering Company's well-known make, with cylinder 14 inches by 24 inches, and will be run at 120 revolutions per minute. Steam will be supplied by a centrally fired Galloway boiler, 7 feet diameter and 28 feet in length, and made by the Edgemoor Iron Company. This is a class of boiler much used in England, on account of economical consumption of fuel and facility of cleaning, and has only recently been introduced into this country. To insure economical consumption of fuel, a brick stack, 140 feet in hight, has been provided. Placed in the engine-room is the Worthington duplex compound steam-pump, with steam cylinders 12-inch and 18½-inch diameter, and 10-inch stroke, which takes its supply of water from a 10-inch main laid from the McClanaghan spring about one and three quarter miles distant, and discharges into an eight-inch distributing main, the open end of which is connected with two pine water-tanks, each having a capacity of 50,000 gallons, and erected on the top of trestles 30 feet in hight, at the highest point of Woodland Park, giving, when full, a head of 140 feet above rail level in the yard. Pipes connected with the eight-inch main will distribute the water when desired. To prevent dangerous water-hammer, air vessels will be placed at proper intervals. The machine-shop will contain the usual machines necessary for finishing castings and forgings required in the construction of engines and cars. The principal feature in it is the four-ton walking-crane, running on a single rail the entire length of the shop. Its power is obtained from an endless hemp rope running at the speed of 1800 feet per minute. These cranes are very frequently used in England, but never hitherto in this country. This shop will employ more than 150 men.

Between machine and erecting-shops, the tool-room and offices for master mechanic and time-keeper are located. In the tool-room, machines for the construction of all tools required in the various shops will be placed; also metal and oil testing-machines.

Erecting-Shop.—This is rectangular in shape, 516 feet 8 inches by 64 feet, with iron Fink roof-trusses, and covered with slate. To give additional light and ventilation, movable sashes are placed in the louvre, which extends nearly the entire length of the building.

The erection of new engines and tenders, and the repairs of others, will be carried on at the western end of this shop, which is connected with the engine-house by a three-rail track suitable for both 5 foot and 4 foot 9 inch gauges. This track extends the entire length of the shop. On each side of the central track, and for a distance of 250 feet from the west end of the shop, will be a pit upon which building and repairs will be executed. To transfer engines to the side-pits from the center track, two overhead 25-ton cranes (traveling) will be used, similar to those at Altoona, and as very generally at work in engine-building establishments in England and other parts of Europe. Power to operate these cranes will be obtained from an endless hemp rope, running at the speed of 4800 feet per minute. This rope is driven by a 7 by 7 Westinghouse engine, placed in the southeast corner of the shop and on the top of the wall on which one of the rails for cranes is placed. The engine makes about 400 revolutions per minute. (The sheave for the driving-rope is keyed directly on the engine-shafts. Boiler and tender work will be carried on at the east end of this building; and to save both time and a large force of skilled labor, a set of Tweddelles's hydraulic riveting plant, made by Fielding & Platt, Gloucester, England, has been ordered, which will insure the best possible class of boiler work being made. This shop will employ about 120 men.

The machines required for boiler work are driven by a 12 by 12 vertical engine, supplied by the New York Safety Steam Power Company, and making 120 revolutions per minute. The main driving-shaft is placed about two feet below the floor of the shop, and is coupled directly to the end of the engine-shaft. Both this engine and the Westinghouse engine are supplied with steam from the foundry boiler.

The Foundry.—This building is rectangular, 252 feet by 72 feet, with iron Fink roof-trusses, and covered with slate. Additional light and ventilation will be provided by the louvre, which extends nearly the entire length of the building. Castings for engines and cars will be made in this building, which is constructed sufficiently large for casting 50 car-wheels per day in addition. A brass foundry will be located in the south-west corner. The two cupolas are of the well-known Collian type, and 40 inches and 47 inches internal diameter respectively. Blast for the cupolas will be supplied by a Baker blower with independent engine.

Hydraulic cranes will be employed to handle the wheels when their construction is begun, and to work the stock-hoist. Two or three molding-machines have been ordered, which will save a large amount of time and labor. The shafting for working the bolting-machines, etc., is driven by a 10 by 12 vertical engine, steam for which, as well as for the Baker blower, accumulator, pump and two engines in the erecting-shop, being supplied from a boiler made by Best & Son, Lancaster, Pa. This shop will employ from 50 to 80 men.

Immediately west of the foundry, the building for stores and offices is located. It is 165 feet by 72 feet, constructed of brick, and roofed with slate, affording accommodation for superintendent, draftsmen, and clerks. It will be heated by steam, and will have two hoists for shifting material between the two floors.

Freight-Car Erecting-Shop.—This is an annular-shaped building, 92

feet wide and 408 feet diameter over outer brick walls. The roof is made of timber, and covered with slate. One half a circle, or 180 degrees, has been built and finished with a brick gable at each end. A louvre provides ample light and ventilation. A central turn-table, 100 feet in diameter, serves the two entrance tracks and the twenty tracks in the building, each of which latter is capable of holding two freight-cars. The large table is capable of accommodating two freight-cars and a switch-engine at once, thus saving a large amount of time and labor. Steam-power will be employed to turn this table, which is of a similar design to the engine turn-table, and with a shallow pit. This shop will employ from 60 to 120 men.

Planing-Mill.—This is a rectangular building 250 feet by 72 feet, with iron Fink roof, covered with slate, and provided with a louvre for additional light and ventilation. The engine-room is 27 feet 6 inches by 16 feet 6 inches, and the boiler-room and shaving-tower 59 feet by 26 feet 6 inches. The engine, made by the Hartford Engineering Company, is 20 inches by 30 inches, and will make 100 revolutions per minute, developing about 150 horse-power. It is supplied by steam from two under-fired Galloway boilers, each 18 feet 5 inches by 7 feet diameter. Shavings and chips conveyed through a tube from the planing-mill will form its fuel, which will be fed automatically by an endless grate. These boilers are made by the Edgemoor Iron Company. The stack is of brick and 120 feet in hight. The planing-mill will employ from 30 to 50 men.

Lumber-Drier.—This building is rectangular in form, and 70 feet by 39 feet 4 inches, with tin roof, and of the well-known form peculiar to the Excelsior & Chicago drier. Exhaust steam from the planing-mill engine will be used for providing the necessary heat.

Steam Heater.—The machine and erecting-shops will be heated by the exhaust steam from the machine-shop engine. The freight-car erecting-shop will be heated by live steam from a special boiler. The planing-mill will be heated by exhaust steam from its engine.

Water Supply.—A thorough system of water supply has been provided in case of fire, and a trained fire brigade will materially add to the general safety of the works.

The wood-working machines of the planing-mill are of the well-known build of Messrs. London, Berry & Orton.

In the afternoon, a special train, provided by the Norfolk & Western Railroad, conveyed the members to the Upland mines of the Crozer Steel and Iron Company, situated near Blue Ridge Springs. These are the mines from which this company will draw a large supply of ore for its new furnace. The ores are expected to yield fully fifty per cent metallic iron in the furnace. In the evening, an elaborate entertainment was provided by the citizens of Roanoke, at the Blue Ridge Springs Hotel.

A session of the Institute was afterward held in the ball-room of the hotel. Mr. J. P. Witherow read an interesting paper on the New Blast-Furnace of the Crozer Steel and Iron Company. The furnace was built under the direction of Messrs. Witherow & Gordon, of Pittsburg, Pa. Building was begun in April, 1882, and finished May 1st, 1883. The furnace was blown in May 28th. The stack is 70 by 16 ; hearth, 9 feet diameter ; tunnel-head, 12 feet 8 inches ; columns, 20 feet above hearth-level, below which they extend 2 feet. The shell or casing is 23 feet diameter at bottom, and 19 feet at top. Double bell, 8 feet 4½ inches external diameter, and 4 feet 4 inches internal diameter, operated by a 32-inch by 63-inch air-shaft, provided with safety catch-rods. The tuyeres are seven in number, with 7-inch nozzles placed 5 feet 6 inches above hearth-level. The furnace is provided with three Whitwell fire-brick hot-blast stoves, 18 feet diameter and 70 feet high, each containing over 20,000 square feet of heating surface. The iron chimney draught-stack is 160 feet by 8 feet. There are ten steel flue boilers ; and two Weimer blowing-engines, with steam cylinder 42 inches and 4-foot stroke, and blowing cylinder 84 inches with 4-foot stroke, and each capable of blowing 12,000 cubic feet of air per minute. The steam-hoist is the Crane Brothers' pattern. The stock-house is 75 feet by 150 feet, frame ; cast-house, 138 feet by 50 feet by 28 feet, brick, with corrugated iron roof. The engine-house is roofed with a sway-bottom iron water-tank 6 feet deep in center. The furnace will have a daily capacity of one hundred tons. The fuel at present used is Connellsville coke ; but the future supply will be drawn from the ovens of the Southwest Virginia Improvement Company, at Pocahontas, Va. The flux—which is a dolomitic limestone—is obtained a short distance from the furnace. The ores used are brown hematites, chiefly from the company's Upland mines, near Blue Ridge Springs, and from the Houston mines, in the Cloverdale ore-belt ; the average distance of these mines from the furnace being about fourteen miles. The ores will average 50 per cent in the furnace.

At the conclusion of Mr. Witherow's paper, Professor Hitchcock made some remarks on the Geological Position of the Philadelphia Gneisses, which were discussed by Messrs. Frazer, Ashburner, Rand, Chance, and Sanders.

Professor Egleston announced the death of Professor Gruner, of France, an honorary member of the Institute, and gave a short sketch of his life. Mr. Ashburner spoke of the recent death of Mr. James Parke, Jr., of Pittsburg, and moved that the President of the Institute be requested to prepare an obituary notice for the Transactions of the Institute.

Sixty-six members and associates were then elected. The secretary read the following papers by title : Repairs and Improvements at Cedar Point Furnace, Port Henry, N. Y., by T. F. Witherbee, of Port Henry. Leaching of Gold and Silver Ores in the West, by Dr. T. Egleston. The Schwartzkopf Control and Safety Apparatus for Steam Boilers, by C. A. Stetefeldt, of New York City. The Shelf Dry Kiln, by C. A. Stetefeldt. The Coals of Pocahontas, Virginia, by Captain C. R. Boyd. The Treatment of Slimes, by F. G. Coggin, of Lake Linden, Michigan. Boilers and Boiler Settings for Blast-Furnaces, by F. W. Gordon, of Pittsburg, Pa. The Timber of West Virginia, by Professor S. P. Sharples, of Boston. Notes on the Geology of Alabama, communicated by Dr. R. W. Raymond, of New York City. The Langdon Gas-Producer, by N. M. Langdon, of Chester, N. J. Determination of Manganese, by Magnus Troilius, of Philadelphia. The Geologico-Geographical Distribution of the Iron Ores of the Eastern United States, by Professor J. C. Smock, New Brunswick, N. J. Volumetric Determination of Manganese, by Messrs. Beebe, Colby, and Mackintosh, of New York. Russell's Improved Process of Lixiviating Silver Ores, by C. A. Stetefeldt, New York. Copper Rocks of South Mountain, by C. Hanford Henderson, Philadelphia. Notes on the Construction of Chimneys, by P. Barnes, Elgin, Ill.

Resolutions were then passed thanking the different railroad companies and the citizens of Roanoke and Lynchburg for courtesies extended to the Institute ; after which, the meeting was declared adjourned.

On Thursday, a trip was made to the Flat-Top coal-fields, going over the New River Division of the Norfolk & Western Railroad, which has just been opened for traffic. This division starts at New River Bridge, and has its present terminus at Pocahontas, the length of the line being 73·9 miles. It follows the valley of New River for a distance of thirty-seven miles, and then turns sharply to the west and follows East River to its head-waters ; thence it crosses a summit to the head-waters of the Bluestone, and it follows this river to the mouth of Laurel Creek, where it strikes the edge of the Flat-Top coal-field ; thence up Laurel Creek to Pocahontas, where the Southwest Virginia Improvement Company has opened up a magnificent bed of the finest quality of coal—a coal which is the exact counterpart of the *best* of the Clearfield coals in Pennsylvania.

New River is one of the few rivers of the world which flows almost due north. It cuts the mountain ranges at right angles, making many gaps, which exceed the celebrated Delaware Water-Gap in Pennsylvania. The scenery generally is very grand ; indeed, it is difficult to imagine any thing more varied and beautiful.

Going up New River, we passed Eggleson's Springs, an old popular Virginia summer resort, now somewhat fallen into decay, but exceedingly beautiful still, with its magnificent rock scenery.

Less than eighteen months ago, what is now the thriving mining town of Pocahontas was a dense forest. In February, 1882, the Southwest Virginia Improvement Company located its coal mines at this point ; giving employment, at present, to about 500 men. It has opened up what is known as the No. 3 or Nelson bed of coal, here 12 feet thick. Already some 6200 feet of gangways have been driven, the main drift being 1600 feet long, 9 feet wide, and 9 feet high. The mine will be worked by the double-entry system of mining ; pillars 16 feet, and rooms 18 feet. Nine feet of the coal-bed will be worked out in advance, leaving 3 feet in the roof to be taken out when the pillars are drawn. Two hundred bee-hive coke-ovens, 12 feet by 6 feet, have already been built, having a daily capacity of 250 tons of 48-hour coke, and the ground has been laid off to accommodate 500 additional ovens, which will be built whenever the market demands.

The present daily output of coal is 400 tons, and in six months it is expected to be a thousand tons or more, which amount can be doubled in a comparatively short time. Expressions of admiration were heard on all sides, not only as to the fine quality of the coal, and the great thickness of the bed, but also as to the thorough and systematic manner in which the entire developments had been conducted ; and to the able and energetic superintendent, Mr. William A. Lathrop, the credit of this belongs.

After an examination of the mines and coke-ovens, we were handsomely entertained with an elaborate lunch provided by the Southwest Virginia Improvement Company. The banquet-room was tastefully decorated and festooned with evergreens and flowers ; and above the door, worked in flowers, were the words, "Welcome, ye Sons of Science!" The occasion was a very happy one, and every one fully appreciated the good things so bountifully supplied.

Our next point was Wytheville, where we spent the night. Some of our number were the guests of the citizens of Wytheville at their private residences ; but the majority found comfortable accommodations at Boyd's Hotel. Here we found ourselves the guests of Colonel Boyd, and right royally did he entertain us.

Next morning (Friday), an early start was made for Cranberry. What member of the Institute had not heard of Cranberry before? A special train, on this as on other occasions kindly provided by the Norfolk & Western Railroad, took us over the Norfolk & Western Railroad, and the East Tennessee, Virginia & Georgia Railroad to Johnson City, Tenn., where we found another train, composed chiefly of observation-cars, waiting to convey us to Cranberry. The Cranberry mine, the property of the Cranberry Coal and Iron Company, is located on the north slope of Hump Mountain, Mitchell County, N. C. The mine is reached by the East Tennessee & Western North Carolina Railroad—a narrow-gauge road 3 feet wide, with 40-pound iron rails—34 miles east from Johnson City. The heaviest curves on the railroad are 18 degrees ; and the heaviest grade, going east, 150 feet to the mile for two miles, and, going west, 80 feet to the mile for a short distance. The railroad follows first the Watauga River and then the Doe to its head-waters. The scenery is magnificent, and beggars description. At the mine, the elevation is 1500 feet above Johnson City and 3250 feet above tide. The mine is worked by tunnel which goes through gneiss rock, etc., for 220 feet, and then through hornblende and associated minerals to ore. Five or six machine drills are in operation, worked by compressed air. The daily output of the mine is at present 140 tons, and from ten to twelve thousand tons of ore have already been mined, a large proportion of which has been shipped to furnaces in the Lehigh Valley of Pennsylvania. The ore appears to be of good quality, and will doubtless make a first-class Bessemer pig-iron ; for all the analyses show it to be comparatively free from phosphorus.

We returned to Roanoke in the evening, greatly delighted with our trip. This ended the regular programme. On Saturday, many of the members availed themselves of the courtesies extended by the Shenandoah Valley Railroad to visit the Natural Bridge and the Luray Caverns ; while others accepted the hospitalities of the iron-masters of Wythe County, and visited the famous Cripple Creek ore-belt.

It is the unanimous verdict that the Roanoke Meeting has been a grand success. Never before perhaps in the history of the Institute have the members received a more cordial welcome or been more handsomely entertained.

To the members of the local committees and to the citizens of Roanoke we were indebted, not only for the dinner tendered us at Blue Ridge Springs, but also for numerous lunches (I might almost say a perpetual lunch) furnished on the cars during our excursions, and for their unceasing efforts to make our visit agreeable.

The great kindnesses received by every one will doubtless be the means of keeping the memory of the Roanoke Meeting as ever-green as were the decorations at Pocahontas.

ROANOKE, VA., June 9.

THE CONCENTRATING MILL AT THE O'NEIL MINES, GALENA, KANSAS.

Referring to the "Concentrating of Ores in Southwest Missouri," published in No. 15, Vol. XXXV., page 207, of this JOURNAL, we now give our readers a description and sketch of one of the numerous small and cheap concentrating-works erected in the last few years in the lead and zinc region of Southwest Missouri and Southeastern Kansas, by the Fort Scott Foundry and Machine-Works of Fort Scott, Kansas. These works were constructed and erected under the superintendence of F. de Stwolinski in charge of their mining department.

The concentrator herein described is situated at the O'Neil mines, formerly the Stanley mines, three miles from the town of Galena, Cherokee County, Kansas.

The ores, galena and zinc-blende, occur largely in pockets, with chert and lime-rock. The raw ore has an average of from five to six per cent of galena, and from twenty to twenty-five per cent of zinc-blende.

The building for the concentrator is 35 feet wide, 44 feet long, and 16 feet in scantling. The boiler and engine are in a small outbuilding, and are inclosed and covered by an extension of the roof of the main building.

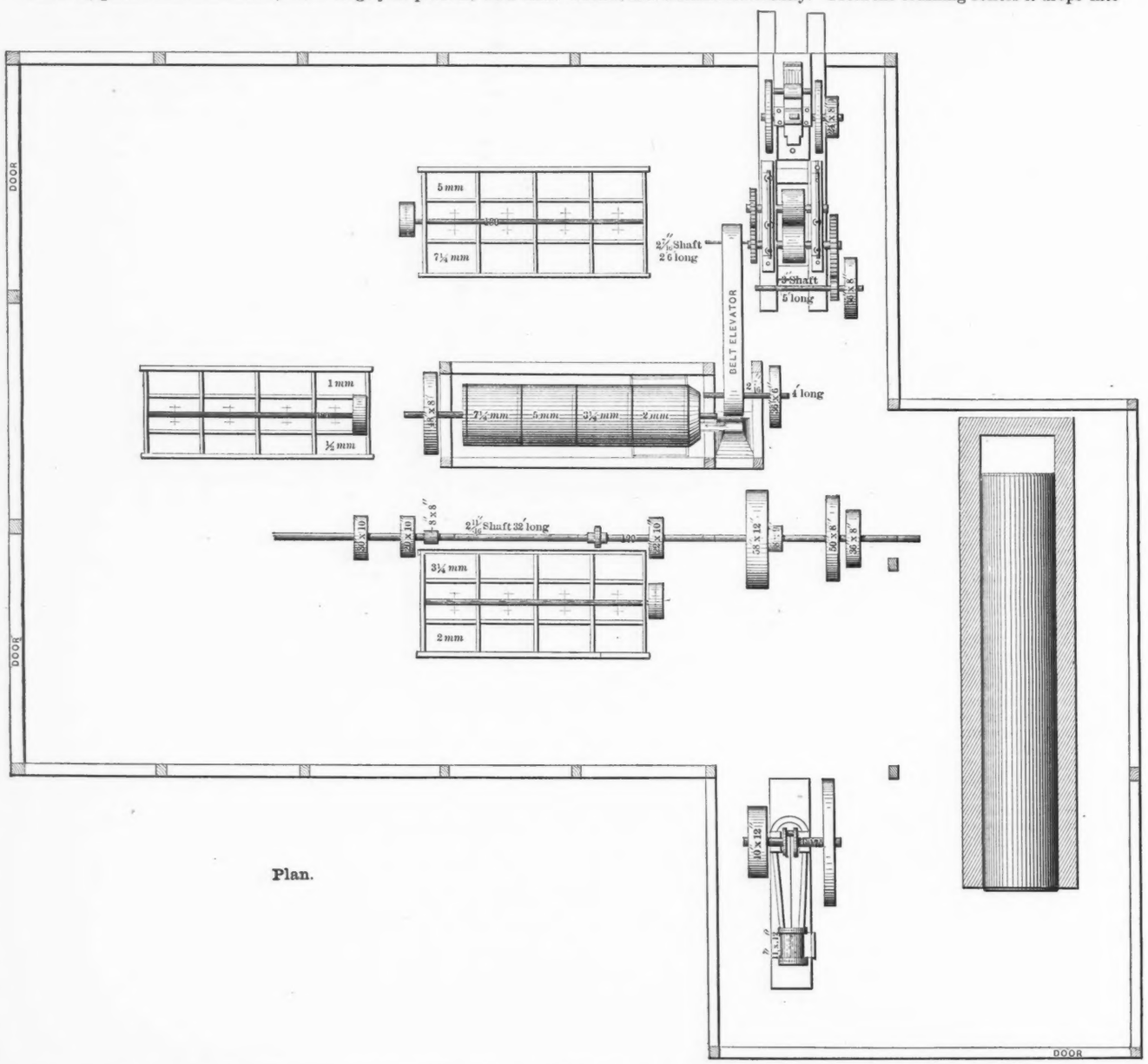
The machinery consists of an improved Blake breaker, 7 by 10 inches opening, one set of crushing-rollers 20 inches in diameter and 14-inch face. The tires on the rollers are of very hard chilled iron, and so arranged on their cores that they can be easily replaced when worn out. The springs used are of rubber. The mill contains one elevator, with 12-inch belt: one revolving sizing-screen, having four sections, each 2½ feet long and 3 feet in diameter, made of Juniata sheet-iron and perforated with holes 2 millimeters, 3¼ millimeters, 5 millimeters, and 7 millimeters; one hydraulic classifier, having two sections; and three double jig-machines, each having eight sieves, four on each side of the box, and forming two complete four-sieved jigs. The sieves on two of these double jig-machines, used for 2 millimeters, 3¼ millimeters, 5 millimeters, and 7¼ millimeters, are 18 inches by 32 inches. The sieves for treatment of fine stuff are 16 inches by 32 inches. The sieve proper consists of a wooden net-shaped frame covered with No. 10 and No. 15 copper wire clothing. The jig-machine for 2 millimeters, 3¼ millimeters, 5 millimeters, and 7¼ millimeters has side discharge (Rittinger) 4 inches square, and bridge regulated by a movable slide. The jigs for fine stuff, 1 and ½ millimeters, have bottom discharge. The jig-machine for the coarser stuff furnishing the most mixed stuff for recrushing is placed so high that it can spout this stuff to the crushing-rollers.

The motive power consists of a direct line, double balance crank, horizontal engine with cylinders 11 inches in diameter and 12-inch stroke. A 35 horse-power boiler is provided to furnish steam for the engine, and a No. 5 Cameron pump lifting water from the creek to a tank near the concentrator, to supply the boiler and machinery with the necessary water.

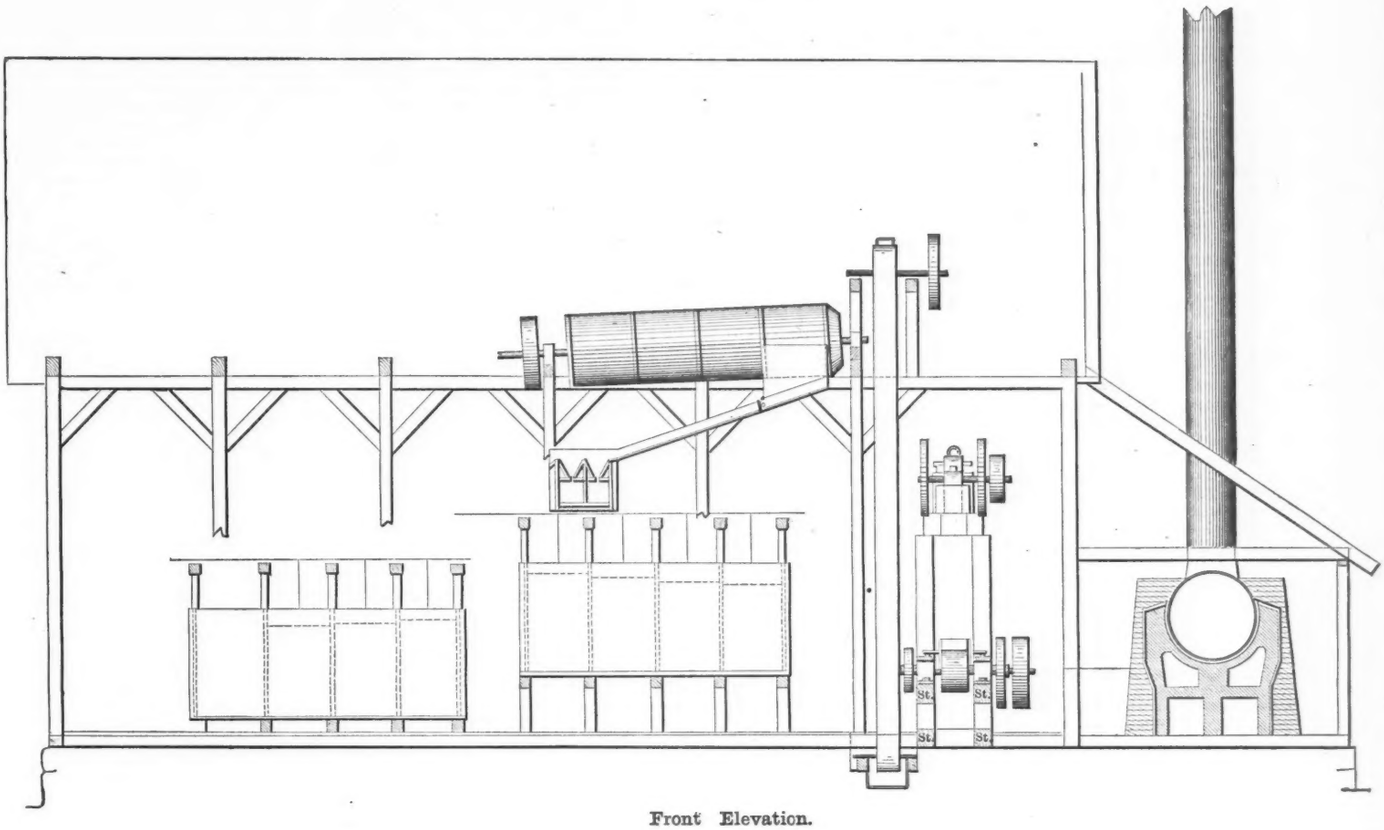
The raw ore is dumped on a platform in front of the Blake breaker, by which it is broken in pieces of one inch and less, spouted to the crushing-rollers, and crushed sufficiently. From the crushing-rollers it drops into the elevator, and is lifted to the revolving sizing-screen. The screen divides the crushed stuff into 2, 3¼, 5, and 7¼ millimeters. The stuff larger than 7¼ millimeters is returned by a spout to the crushing-rollers, and the 2 millimeters and less is subdivided by the hydraulic classifier into three grades, 2, 1, ½ millimeters. The 5 and 7¼ millimeters is spouted from the screen to the double jig-machine near the crushing-rollers; the 2 and 3¼ millimeters to the one opposite; and the fine stuff, 1 and ½ millimeters, to the jig on the end part of the building. Each of these six sizes has for its separation four sieves, having a jigging surface of 16 square feet.

The first sieve of the jig-machine discharges very clean galena; the second sieve, galena and zinc-blende mixed; the third sieve, clean zinc ore; the fourth sieve, zinc ore and rock; and the overflow is clean rock. The galena drops from the discharge into boxes; the clean zinc ore from both sides of the jig is spouted to small cars on the end of jigs; and the tailings are spouted to the outside of the building.

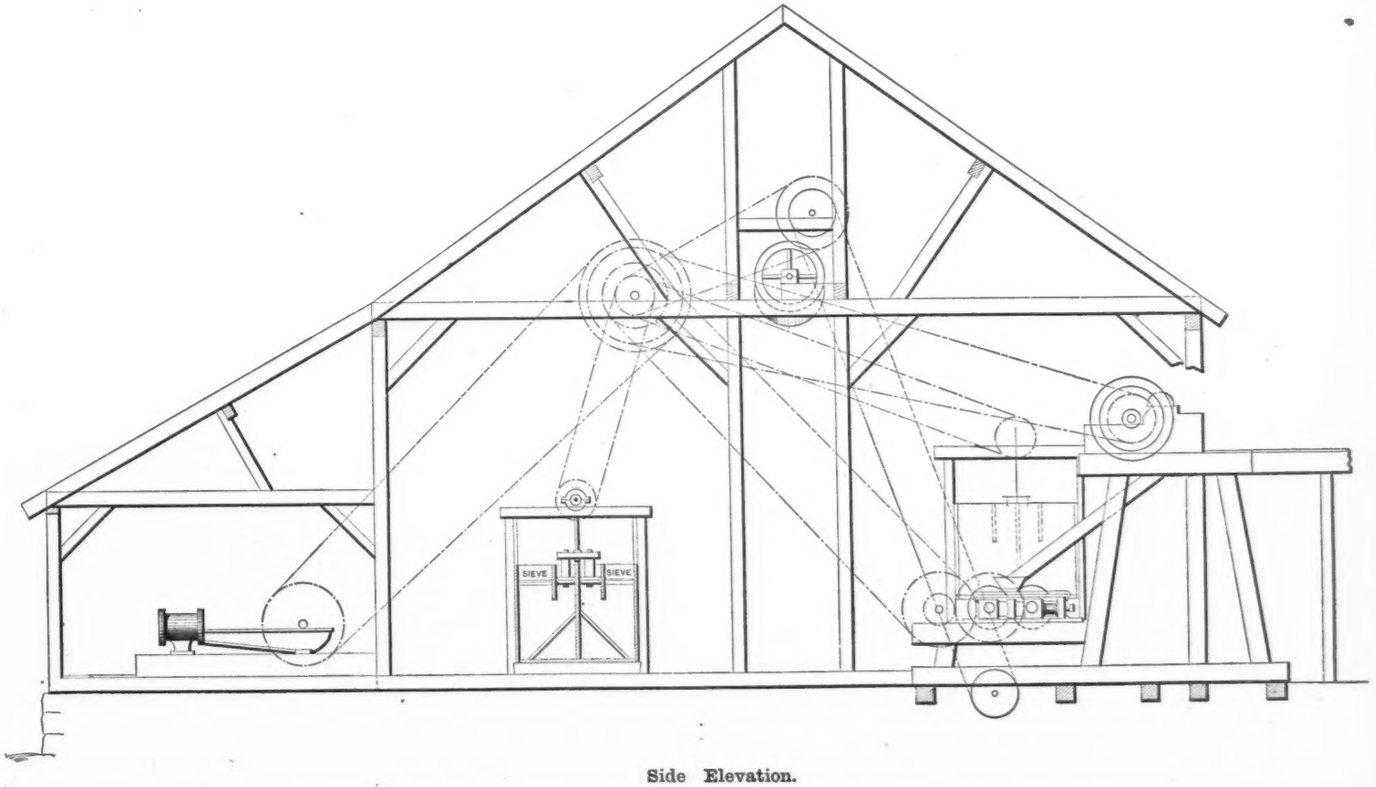
The capacity of these works is sixty-five tons per twenty-four hours. The force to run it is one hand feeding the Blake breaker, one hand attending to the jigs, and one hand for removing the clean product to the outside—a total of three hands for one shift. The cost of all the machinery complete, including engine and boiler, was only $5200.



Plan.



Front Elevation.



Side Elevation.

THE CONCENTRATING MILL AT THE O'NEIL MINES, GALENA, KANSAS.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Mr. Arents and the Stetefeldt Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. A. Arents, of Alameda, Cal., has written a report upon the metallurgical treatment of the ores from the Mount Cory mine, Esmeralda County, Nev., which contains such valuable generalizations as to certain combinations of machinery and processes that they should become generally known. The crushing of the ore is to be done by Krom's steel rolls; and for extracting the silver, lixiviation with hyposulphite solution will be adopted. As the most important point to be settled, there remained the selection of the roasting-furnace. Let us see how Mr. Arents disposes of this question. He says:

"For roasting in a Stetefeldt furnace, and subsequent amalgamation, or amalgamation in any case, finely-divided pulp is required; while for purposes of leaching, a coarse material is just as good, and even preferable, for which reason stamps, Stetefeldt furnace, and amalgamating pans should go together, and rolls, cylindrical roasting-furnaces, and leaching-tubs also."

After speaking of the cylinder furnaces at the Geddes & Bertrand mill, Nevada, he says:

"A Stetefeldt furnace of the same capacity these four furnaces possess will use about 5 cords of wood, 5 per cent of salt, and 3 men in 8-hour shifts in the twenty-four hours, the Stetefeldt furnace not requiring any power to drive it, except the elevator and screen, which is very little compared with the power to drive these four furnaces, each of which requires from 4 to 6 horse-power all the time. All these facts speak in favor of the Stetefeldt furnace. But, at the same time, the Stetefeldt furnace requires finely-divided pulp, and to obtain it stamps are necessary, while stamps are certainly more expensive in every way than rolls; and, after roasting such fine pulp, amalgamation must follow, which again is in every respect more expensive than leaching."

These sentences seem to possess the ring of good coin, and may be taken as good law even by professional metallurgists, who have a limited experience only in this direction. I am myself a strong advocate of rolls versus stamps, and put my opinion in print before the success of Krom's rolls was established at the Geddes & Bertrand mill. I am also very enthusiastic about lixiviation, and have advised its introduction in the new Ontario mill in place of amalgamation. The results of the remarkable experiments which Mr. E. H. Russell has carried out at the Ontario mill with his new lixiviation process will be published shortly by myself.

So far, the conclusions of Mr. Arents have my earnest support. When, however, he proceeds to wipe the Stetefeldt furnace out of existence with a stroke of his pen, it is only fair that I should be granted a hearing because the good coin which he offers may be, after all, nothing but counterfeit.

Mr. Arents has made quite a reputation as a smelter, and he is well known as the inventor of the so-called siphon-tap for lead furnaces. His milling experience has been confined to the running of a tailings-mill in Dayton, Nev. With the Stetefeldt furnace he has had no experience whatever, and does not know what it can do, or what it can not do. In such a case, a man is easily misled, if he allows his fancy to formulate general laws.

Now, what are the facts in the case? A full discussion of this question would require more space than is at my disposal, and I can consider only the principal points.

The fineness to which an ore has to be pulverized for a complete roasting, preparatory to amalgamation or lixiviation, depends principally on the manner in which the silver-bearing minerals occur in the gangue. If the minerals are finely disseminated in a hard quartz, crushing as fine as No. 60 screen may be necessary. For ores of granular structure, much coarser screens can be successfully used. The limit in each case must be found by experiment. For amalgamation, this limit is fixed by the settler. The settler will not operate with coarser material than is produced by crushing in a battery through No. 30 screen. In order to convey a better idea of what this really means, I will state that if pulp crushed through No. 30 is sifted by hand through a No. 40 screen, only from 8 to 10 per cent of the ore does not pass this screen. At the Ontario, I had some ore crushed through No. 20 screens. Of this pulp, 13·8 per cent remained on a No. 40 screen. In this case, there was a marked difference between the value of the coarse and fine portions of the ore, the latter assaying 80 ounces, and the former only 30·2 ounces in silver per ton. At the Lexington mill, Butte, Montana, the difference between the fine and coarse portions was by no means so marked. In former times, No. 80 and No. 60 screens were used in dry-crushing silver mills. The wrong idea prevailed, that the results of amalgamation would be thereby improved. This idea was an inheritance from raw amalgamation, where the ore is finely ground in the pan. It was also an inheritance from the Freiberg barrel amalgamation, where the roasted ore was bolted. In this case, the bolting was done to get a pulp of uniform consistency in the barrel. The amount of water used in barrel amalgamation is hardly sufficient to bring all the soluble salts of the charge into solution. Hence any lumps in the roasted ore would not soften, and their silver remain unextracted. This is also the case, to a certain extent, in pan amalgamation. I have drawn attention to this fact in my article on the Lexington mill, which explains why chloride of silver is found in tailings.

The low capacity of the battery with fine screens stimulated to try coarser crushing, and No. 40 screens came into general use. For a long time, nobody dared to go farther. Finally No. 30 was given a trial with good results, and is now generally adopted. All attempts to go still farther have failed, on account of the impossibility of working heavy sands out of the settlers without losing quicksilver. Only recently a No. 26 screen was used at the Ontario, but had to be abandoned for the reasons stated above.

While there exists a mechanical limit in the coarseness of crushing for amalgamation, there exists none if lixiviation is used. Here it simply becomes a question how coarse can the crushing be done to get a perfect roasting, because those particles of mineral which have been reached by the roasting can, undoubtedly, also be reached by the solutions used for the extraction of the silver. If we closely analyze the two rules of Mr. Arents, and the explanations accompanying them, by which metallurgists are to be guided in the future, we have the following propositions: 1st. The Krom rolls can not produce pulp the principal percentage of which will pass through a No. 40 screen. Mr. Arents excludes the combination of rolls and amalgamation, and distinctly states that to obtain such pulp stamps only can be used. 2d. Finely-divided pulp is essential for amalgamation. This statement is somewhat loose, since Mr. Arents does not give the size of screen. But it is evident he meant that for amalgamation a large percentage of the ore should be in that fine condition which approaches dust, and is produced largely by stamps, and much less by rolls. 3d. Ore crushed by stamps and roasted in a Stetefeldt furnace must be amalgamated, and can not be worked by lixiviation. 4th. The Stetefeldt furnace can not roast ore which is crushed by rolls, since it can treat finely-divided pulp only. This statement is also loose, but, most likely, intended to convey the same meaning as in the second proposition.

Let us examine these propositions in detail.

1st. Regarding the first one, I beg to refer to a correspondence from Mr. Krom, who knows best what his rolls can do:

C. A. STETEFELDT, M.E.:

DEAR SIR: In answer to your inquiry in relation to the capacity of my steel rollers for producing pulp which will pass through a No. 40 wire screen, or finer, I have to say that there is no more difficulty in crushing fine with rollers than with stamps. The difference is, however, in favor of rollers for producing fine pulp. The fineness to which the ore is crushed in either case limits the capacity. For example, we have demonstrated that two sets of 26-inch steel rollers are equal to about 50 stamps, say of 750 pounds each, whether the ore is crushed fine or coarse. The amount of fine dust produced by rollers is not so great as when the ore is crushed by stamps. At the Austin mill, I found that crushing with rollers through a No. 16 mesh screen there was produced 16 per cent of fine pulp, which passed through a No. 100 screen. One half of this went into the dust-chamber as floating dust. Yours very truly, S. R. KROM.

2d. If Mr. Arents is of the opinion that finely-divided pulp is essential, or even beneficial for amalgamation of roasted ores, he is very much mistaken. The fine dust which is drawn from the dust-chambers of a Stetefeldt furnace, if amalgamated by itself, gives results far below its chlorination. There is a good opportunity at the Ontario mill to observe this fact. The dust escaping from the battery is collected in a long flue, which can only be cleaned when the battery stops. As many as 30 tons of dust accumulate in this way, and have to be roasted by themselves when the mill is to be shut down. Although well chloridized, this dust yields in amalgamation only from 75 to 80 per cent of its silver, the regular mill work being from 89 to 92 per cent. The crushing at the Ontario was formerly done through No. 40 screens. A change to No. 30 produced no detrimental effect. Recently the No. 30 screens were replaced by No. 26 screens. Mr. Russell has averaged the mill work for two weeks prior to the change, during the change, and for two weeks after it, with the following results:

	Furnace No. 1.	Furnace No. 2.
Using No. 30 screen.....	89·8 per cent.	89 7 per cent.
" No. 26 "	90·0 "	91·1 "
" No. 30 "	90·4 "	90·2 "

If these results prove any thing, they prove that coarse crushing is rather beneficial than injurious to amalgamation. Most decidedly, it is not essential. At the Lexington, the ore coming from the battery was passed through a Krom revolving screen with No. 40 wire-cloth, and about 10 per cent of coarse material was returned to the battery for recrushing. It was done as an experiment, and also to relieve the settlers. The returning of the coarse material to the battery proved to be inconvenient, disturbing the action of the self-feeders, and Mr. Wartenweiler provided the Krom screen with No. 30 wire-cloth. No increase in the value of the tailings was observed, and the amalgamation of the silver has averaged, from December 1st to April 1st, 90·6 per cent.

At the Panamint mill, I tried crushing through No. 20 screen, without lowering the results of amalgamation, but could not continue to use it on account of settler work.

3d. That ore crushed by stamps and ore roasted in a Stetefeldt furnace can not be worked by lixiviation is a most remarkable statement. Since Mr. Arents seems to be satisfied that ore crushed by stamps can be well roasted in a Stetefeldt furnace provided the pulp is finely divided, he refers, no doubt, to the mechanical difficulties of lixiviation merely. Here again he imagines that he has to deal, principally, with impalpable dust, which would prevent filtering of the solutions. Very likely he is also entirely ignorant of the fact that nearly all the dry-crushing silver mills now use No. 30 screens on the battery, as we have stated above. But we have an array of facts which flatly contradict his assumption. Mr. Russell's lixiviation experiments at the Ontario mill, which have been conducted on a working scale with charges of 2 tons in one tank, have met with no mechanical difficulties whatsoever. The solutions pass freely through a charge 30 inches in depth. Forty tons of Ontario ore extracted by lixiviation yielded 92·6 per cent of the silver, when amalgamation, at the time these experiments were made, extracted only 90·2 per cent. It will be of importance to state that the character of Ontario ore is by no means very favorable for the mechanical part of lixiviation, since it contains about 25 per cent of clay.

Mr. Arents should also be aware of the fact that O. Hoffman has successfully leached the ores from the Silver King mine in Arizona, and that lixiviation is in use at the Barranca mine and others in Sonora, Mexico. In both cases, the ore is crushed by stamps. In the first case, the roasting was accomplished in cylinder furnaces; in the second case, in reverberatory furnaces.

4th. We now come to the most important proposition, namely, that the Stetefeldt furnace can not roast ore which is crushed by rolls, since it requires finely-divided pulp.

We have stated before that for a certain ore there exists a limit of coarseness in crushing in order to obtain a good roasting. This limit, in

particular cases, has not been reached with the Stetefeldt furnace, because, wherever this furnace has so far been used, amalgamation follows the roasting. We have also stated that the limit is fixed by the capacity of the settler to deal with coarse material. Neither are there facts extant as to this limit, if the roasting is done by furnaces which roast the ore in charges, and not by a continuous process. Taking it for granted that this limit is sooner reached by the Stetefeldt furnace than with the reverberatory or cylinder-furnace, it becomes a question of economy to which furnace preference should be given. Now of the different operations through which the ore has to pass, the crushing is the least costly, and the roasting the most expensive.

It is also evident that, if we approach the limit of crushing for periodically working furnaces, the charge will have to be kept a longer time in the furnace to effect a complete roasting of the coarser particles. If this was not the case, why, for instance, would it be necessary, at Mansfeld, to pulverize the copper matte so fine for the Ziervogel process that it will pass a No. 32 wire screen? Here, too, leaching follows the roasting. Hence, with coarser crushing, we need a more extensive furnace plant, and augment the cost of roasting. Mr. Arents himself puts considerable stress on the economical working of the Stetefeldt furnace as compared with the cylindrical furnaces. After all, the two limits can not be very far apart, and a slight increase in the cost of crushing and a considerable saving in the expense of roasting must be considered as the only true economy.

Old statistics on the working of the Stetefeldt furnace have created the impression that the dust is better chloridized than coarser portions of the ore. Those statistics came from mills where the roasted ore is immediately cooled after discharging, and not "banked up" and left in red-hot state for twelve hours on the cooling-floor, as done in the Ontario and Lexington mills. For some ores, this treatment is not essential, and, in fact, the older mills had no facilities for doing it. Other ores are so materially benefited thereby that differences in chlorination as high as 45 per cent may occur if chlorination tests are made, taken immediately after discharging, or after the ore has been left for twelve hours on the cooling-floor. The dust-chambers are not discharged frequently, and the last ones may be left undisturbed for a week. Consequently, the ore in these chambers has already gone through the "banking-up" process by the time it is discharged. If, in the cases to which reference is made above, the ore from the shaft had been left for twelve hours on the cooling-floor, and then sampled, the chlorination would have been several per cent higher, and above that of the dust.

That coarser crushing does not deteriorate the work done by the Stetefeldt furnace is partly shown in answering the second proposition of Mr. Arents. But some more facts will be adduced here. When the experiment of crushing through No. 26 screen was made at the Ontario, the chlorination tests with Mr. Russell's improved lixiviation process gave the following results:

	Furnace No. 1.	Furnace No. 2.
Using No. 30 screen	92·2 per cent.	92·4 per cent.
" No. 26 "	92·8 "	93.0 "
" No. 30 "	92·3 "	92·5 "

In reference to these experiments, Mr. Russell writes to me: "I think the Stetefeldt furnace would chloridize as well ore crushed with No. 20 screen as with No. 30 screen on the battery."

Mr. Russell also made the following experiment. A number of cars of roasted ore drawn from the shaft, return-flue, and dust-chambers of the Stetefeldt furnace were sampled immediately after discharging, and subjected to Russell's lixiviation test:

	Silver extracted.
Roasted ore from shaft	93·2 per cent.
" " return-flue	91·8 "
" " dust-chambers	91·4 "

Further comment is unnecessary.

The supposition that the Stetefeldt furnace requires finely-divided pulp is entirely refuted.

If Mr. Arents wants any of my statements verified, he will please address the proper parties to whom I refer. He also will oblige me by a reply.

C. A. STETEFELDT.

24 CLIFF STREET, NEW YORK CITY.

OFFICIAL STATEMENTS AND REPORTS.

THE RAY COPPER COMPANY, MINERAL CREEK, ARIZONA.

The Ray Copper Company, of which George H. Sargent, of New York, is president, and Louis Zeckendorf, secretary and treasurer, is a company recently incorporated under the laws of the State of New York, with a capital of $5,000,000 divided into 500,000 $10 shares, of which 125,000 shares have been reserved to provide a working fund. Under date of December 20th, 1882, Col. John M. Haskell reports on the property, which is located in the Mineral Creek District, Pinal County, Arizona, and embraces seventeen mining claims, a furnace rated at 30 tons, water-right, etc. There are two groups of mines, the first the Ray group, on one vein, reported to be of great width and carrying large bodies of rich copper ores. Mr. Haskell figures out over 2000 tons of ingot copper in one block, 150 feet long and 50 feet in depth. Some development-work has been done on it. The ore carries principally native copper, and it is proposed to crush and wash it. The second group of mines, including the Bilk, Scorpion, and Munroe, are narrow veins, but little developed, carrying carbonate smelting ores. They and a number of prospects are estimated to have 3000 tons of 20 per cent ore in sight, and the work of putting them through the smelters is to be begun at once.

AN OLD ENGINEER DEAD.—On the 11th of June, Calvin Briggs, who fired the first coal-burning engine, the Phœnix, on its first trip over the Long Island Railroad, and who is said to have run an engine more miles without repairs than any other engineer, died suddenly at Greenbush. The original cause of his death was an injury received in a steamboat explosion thirteen years ago.

THE CLEVELAND MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The arrival of increasing numbers of mechanical engineers during Monday and Tuesday made the appearance of the blue badge of membership more and more frequent at the head-quarters of the society, the Forest City House; and at the opening session of the society, the rooms of the Vocal Society at the City Hall were completely filled, fully one hundred ladies and gentlemen being present.

Mr. J. F. Holloway, Chairman of the Local Committee, introduced Mayor Farley, who, in behalf of the citizens of Cleveland, welcomed the society. Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass., President of the Society, made a brief reply, in which he dwelt upon the beauty of the city, and then called upon Mr. J. F. Holloway, of Cleveland, President of the Cuyahoga Steam Furnace Company, for his paper on

THE MARINE ENGINES ON THE LAKES, AND A DEVICE FOR GETTING THEM OFF THE DEAD-CENTERS,

in which he sketched the history of the development of the marine engines of the lakes. The carrying capacity of the vessels has been largely increased, and the peculiarities of the navigation of the lakes have made it necessary to obtain this mainly by adding to their length and beam, rather than by increasing their depth of hold. Since the strength of a hull is largely dependent upon the depth of its sides, and since the overhead arches, formerly used, have been found of late years to interfere with loading iron ore and lumber, the difficulty now is to build a hull that shall be strong enough to carry, in addition to its own cargo, the power required for its own propulsion, as well as the power required to tow one or two vessels of the same tonnage behind it. One of the results of putting such powerful machinery into hulls of this description is, that the hull, being long and comparatively shallow, lacks vertical stiffness. It readily responds to the pulsations of the engine, until, at certain speeds, where the number of strokes comes into unison with what might be termed the time of vibration of the hull, due to its weakness, the shaking becomes a very serious matter. While this is true of an engine having a single crank, the use of engines having double cranks placed at right angles does not in the least help the matter; for not only are cranks so placed much more difficult to balance, but they have, in addition to the up-and-down motion, another motion which may be called an *athwartship* motion. When the crank-pins of such an engine are both on one side of the main shaft, they produce a severe side-thrust upon the main journal-bearing, opposite them, which tends to push it sidewise. This side strain, on the return-stroke of the piston, is of course transferred to the other side of the journal-box, and thus these alternating side-thrusts, added to and merging into the up-and-down motions, combine and form a sinuous motion much more destructive to the hull than the simple up-and-down motion first referred to. Of course, these difficulties are increased when the engines are to any extent unbalanced, experience having shown that, the better all engines are balanced, the less will be their influence upon the hull. The first successful attempt to overcome this vibratory action of the engine upon the hull was made in the construction of the steamship Amazon, which was built in the year 1873. The hull of this vessel was in some respects peculiar: it was 240 feet long, 40 feet beam, and 20 feet depth of hold. She was propelled by twin screws, and had two stern-posts, and was built without overhead arches. Each wheel was driven by a pair of fore-and-aft compound engines; but the cranks, instead of being placed, as usual, at right angles with each other, were placed so as to bring the crank-pins directly opposite each other. These engines made, ordinarily, 75 revolutions per minute, and so well was the labor divided between the two cylinders, and so carefully had the reciprocating parts of the engine been balanced, that the main shaft, instead of being first pounded down on the bottom of the journal and then against its cap, seemed to be almost suspended in the air. The result was, that there were no vibratory motions to be transferred to the hull, and it was almost impossible to tell, when standing on the bow of the boat, whether the engines were in motion or not. As a better evidence still of the value of this arrangement of the crank-shafts of a marine engine, there is an instance of a large propeller built recently, which had a pair of fore-and-aft compound engines, coupled to the main shaft in the usual way by cranks placed at right angles with each other. While the construction of the hull of this propeller differed in no way, either as to its shape or strength, from boats as usually built, it was so severely shaken by the machinery during the first season it was in commission, that it was very evident to the owner as well as the crew that it could not long endure such usage. At the close of navigation, the cranks upon the main shaft were so changed as to bring the crank-pins directly opposite to each other, and the result was, that the hull no longer suffered from any motion of the engine.

Vessels heavily laden are now obliged to move slowly and with great caution while entering or leaving port, and the frequency with which the engines are made to stop, start, back, or go ahead, renders them quite liable to "catch on the center." Owing to the crowded condition of the ports, and the numerous bridges to be passed, if an engine is thus, even for a brief time, disabled, there is great danger lest the vessel shall do or receive serious damage before the engine can be started "off its center," in the usual way—the usual way being to hunt up an assistant or a fireman and send him below slowly to pinch over the crank-wheel, with a pinch-bar—an operation not only slow, but also dangerous. Mr. Holloway describes the device which he has successfully employed for starting the engine off its center as follows:

It consists of a short-stroke steam cylinder, located in the hold of the vessel, and alongside of the propeller shaft. I place it at the point where the in-board and out-board shafts are coupled together, as the rim of the coupling is very convenient for carrying a portion of the machinery. I place on the coupling-flange or on the shaft a wheel having on its face a series of V friction-grooves. Opposite to this friction-wheel, I place either a short segment of a wheel, or a short straight block of iron, which has upon its face a series of V friction-grooves corresponding to those on the wheel. This block or segment, as may be most convenient to be used, is connected directly with the piston-rod of the short-stroke steam cylinder; and it is also so arranged that it may be made to move toward

the friction-wheel, and to come in close contact with it, by means of an eccentric journal, or a similar device.

Now, if in working the main engine forward or back, it becomes caught upon either the upper or lower center, the valve-gear of the engine may be set for turning the engine in the direction wanted, and the throttle-valve may be opened so as to admit steam on the piston if desired. Now, if the block or segment of the starting engine be brought in close contact with the friction-wheel on the propeller shaft, and steam then be admitted to the piston of the starting engine, the friction-wheel and the shaft to which it is attached will be turned a distance equal to the length of the segment or the block. This distance is regulated by the length of stroke of the cylinder of the starting engine, and will be just enough to throw the crank "off the center."

The main engine will move off at once, having already had its valve gear placed in position, with the throttle-valve open; while the starting engine has pulled or pushed the segment or block out of gear with the friction-wheel, and of course out of the way, without any further attention from the engineer. The handles for bringing the block or segment into gear with the friction-wheel, as well as the handle for admitting steam to either side of the piston of the starting engine, will both be placed conveniently near to where the engineer stands while working the main engines. He is not obliged to leave his place to work the starting engine.

The starting engine is designed to work either way, and to turn the engine off either center. If, when it is required for use, the piston should happen to be at the wrong end of the cylinder, the engineer will move the block or segment back from contact with the friction-wheel, will make one stroke of the piston without touching the wheel, and will then move the segment or block back in contact again, when the starting engine will be ready to turn the propeller shaft in the direction wanted. This is done with but a very slight loss of time, and without any necessity for calling upon any one for assistance.

The next paper was by Mr. Howell Green, of Jeanesville, Pa., on

THE HISTORY AND DEVELOPMENT OF THE WINDING AND PUMPING MACHINERY OF THE ANTHRACITE COAL REGIONS.

The anthracite coal-beds of Pennsylvania (some 15 in number)—classified by the color of the ash—may be divided into four groups. The uppermost group is red ash; the second, gray ash; the third, white ash; and the fourth, or lowest group, is, again red ash. This color of the ashes might seem more of a chemical than a mechanical question; but as it is a tolerably sure criterion of the condition of the water in the mine, as well as of the burning properties of the coal, it was early noticed.

These beds of coal lie at every possible inclination to the horizon, dipping under the surface over 2000 feet (say 1000 feet below the level of the sea), and running up mountains hundreds of feet above the beds of adjacent streams.

The first coal was mined where it was most easily got at, so that in the earlier days of the trade (which commenced about 1820), only drifts or tunnels above water-level, and strippings near the surface, were used to get the coal.

Soon the requirements of the market made it necessary to go into the depths of the earth for coal, and means had to be provided to hoist the same, and to keep the mine clear of water.

The soil in the coal regions is poor; and before mining began, population was sparse, the few inhabitants combining hunting, fishing, farming, and lumbering in about equal proportions for a livelihood.

On the influx of strangers, who thronged to the newly-opened mines, among others there came miners and engineers from England, Scotland, Wales, and Germany, who had seen mining machinery and appliances at home; and here in the new world they constructed engines and pumps. Native ingenuity and the absolute necessities of the situation prompted men to plan and build the contrivances to win the coal. Money and enthusiasm lent their powerful aid, and the ever-increasing sum of human knowledge has made it possible to show, in the last number of the series of mining plants, very handsome examples of the mechanical engineering of the anthracite coal regions. The progress is shown in that series from first to last. Some of the early members are yet standing, in obedience to the old law of the survival of the fittest; while many of them kindly (though sometimes unkindly) have been consigned to the cupola and heating furnace, where have been transmuted so many darling creations.

Very early in the progress of mining below water-level, it was seen that means had to be provided to hoist from 300 to 400 feet at one lift, so as to get space for breasts, to work the coal profitably; and the quantity of water to be raised was found to run into hundreds of gallons per minute. From the first, both slopes and shafts were used. The mine-cars in the anthracite regions have always been large, starting in the early days at about 40 cubic feet capacity, and standing now at about 96 feet. The wheels of the cars have been from 12 to 20 inches diameter; 18 inches is now most generally used. The axles have been from 2 to 2¾ inches diameter. The gauge of the mine railroads varies from 30 inches to 48 inches; in a few cases, it is 4 feet 8½ inches. At first, chains were used for hoisting, and some of the early shafts had hemp ropes. Flat chains, or rather, three chains side by side, with alternate large and small links, and with blocks of wood through the large link, were tried. These flat chains were wound on flanged spools like a ribbon. Iron and steel bands were used, but the conclusion of the greatest number now is to use iron-wire round ropes. Not that iron-wire ropes are better than steel-wire ropes; but questions of endurance, cost, etc., in relation to wear and weight and work in acid water, have rather been against steel-wire ropes. In a shaft, no rope rollers are used, but on a slope—particularly one with varying pitches—the question of a roller to protect the rope is most important. While it has been a vexed question, yet after trials of hundreds of forms and many kinds of material, it seems to be considered that a hardwood roller about eight inches diameter, truly turned, and kept clean and clear, is the best for ordinary strains. It was soon found out, in using wire ropes, that the life of the rope was much lengthened by making the drums and sheaves of large diameter; the rope must spring around the drums and sheaves, and spring back, and not receive a permanent set.

The first steam-engines used for hoisting anthracite coal and pumping the water (and at first they combined both duties) were single high-pressure engines, with flat bed-plates bolted on wood frames. The steam cylinder would be perhaps 18 inches diameter, with 6-foot stroke. A cast-iron crank-shaft, with perhaps a 10-inch journal, carried the heavy fly-wheel. On the crank-shaft, there was a pinion 30 inches diameter, of 3 inches pitch and 12 inches face, which geared into a drum-wheel 60 inches diameter, which was just above the pinion. Just under the pinion, was the pumping-wheel, 8 feet diameter; this pumping-wheel had holes in it to receive a pin for working the pump. The drum-shaft was of cast-iron, with perhaps an 8-inch journal; its body, as that of most all other shafts then, was octagonal, and the drum-wheel spiders and almost every thing else were staked and keyed on by the methods of the old millwrights. The drum was from 5 to 8 feet diameter, and about 11 feet long, and was formed of hardwood laggings bolted on spiders. To wind a car 400 feet with a 5-foot drum, the engine would have to make about 48 revolutions, which it was made to do in about one minute. The pumping-shaft was also of cast-iron, with perhaps 11-inch journals; and the drum-shaft was lifted in and out of gear by a strong wooden lever, one of the pillow-blocks being hinged for that purpose. The pump was, of course, near the bottom of the mine, perhaps 400 feet away. It was a lifting-pump, 16-inches bore, 7-foot stroke, fitted with a bucket faced with sole-leather, the rod of which went through a stuffing-box in a goose-neck or turn-piece. Up the slope or shaft went a wooden rod, 8 inches square, carried on flanged rollers. The rod was spliced with plates 4 inches by five eighths of an inch by 10 feet, and on top of the slope or shaft were one or more rocking bobs, provided with great balance-boxes.

The rods connecting the balance-bobs to the wheel were 8 inches by 16 inches, and were provided with suitable straps, etc.

The valve-gear of this engine consisted of two eccentrics and rods with hooks on the ends, which the engine-man lifted in and out of gear with his feet, thus leaving his hands free for full control of the slide-valve, which he operated with a long bar. He regulated the quantity of steam for the engine by a throttle of the stovepipe-damper pattern. Thirty years ago, such a pumping and hoisting-engine was considered first-class, and many of the old fellows are yet at work.

Such an apparatus was subject to many mishaps. With a heavy fly-wheel whirling around, and the slide-valve at the will of the engine-man, unnecessary strain could be easily thrown against the engine, and broken cranks and shafts were often the consequence. Also, if in lifting the drum out of gear, it was not securely scotched, the unbalanced end of the chain would fly down the slope or shaft. When it was necessary to connect or disconnect the pump-rods, the rocking bobs had to be securely blocked, and sometimes the assistant forgot to take out the last block—and then trouble came.

This state of affairs was much improved by putting up another engine, so that one engine could pump, and the other one could hoist. Next it was discovered that two engines could be attached to the same shaft, at right angles to each other, so that no fly-wheel would be wanted. Yet on some of the first pairs so built, small fly-wheels were put on—probably to verify Darwin's theory of gradual development. The first of these double engines had two eccentric hooks to each engine, making four in all, which the engine-man had to lift with levers now he had two engines to handle, and it took a lively man to do it; but since there was little or no fly-wheel, no great danger was incurred. The engine-man, therefore, hooked one engine in and started the load with the free engine. These double engines with four hooks did very well. Next, links for valves were introduced, and they are now generally used.

It was found that hoisting and pumping-engines in which cog-wheels were used were subject to noise and break-downs; and as the miners went deeper, it was found that drums keyed immediately on the crank-shaft of a double engine did the best. This change, of course, involved larger steam cylinders, and in the place of wood-faced drums cast-iron ones were made, which soon led to the use of spiral grooves to keep the ropes from chafing. Still further, these drums were made conical, so that when the heavy load was to be started, the small end of the cone did the pulling, while the empty car (and cage, if in a shaft) pulled by the large end of the cone on the other side. This arrangement is the best yet tried, and so the hoisting-engines stand to-day. These are strongly-built double engines on strong stone foundations, with steam cylinders from 20 to 40 inches diameter and stroke from 4 to 6 feet. There are heavy wrought-iron shafts, spiral-grooved cast-iron conical drums, steam-brakes and steam reversing gear, with appliances to prevent over-winding, with safety-catches and detaching gear; and, barring waste of steam, the world can show no better hoisting-engines than are in the anthracite coal regions of Pennsylvania.

To a mine below water-level, the pump, or other appliance to raise water, is of first importance. When man enters nature's great storehouses in search of wealth, he finds that water is ever ready to dispute his supremacy. Sometimes it is the constant stream, only varying with the season; often there are great quantities stored in the crevices of the rocks. In parts of the anthracite coal regions, the fact has been shown that the first 100 yards down the vein has the most water; the next 100 yards has less; and after that, the vein is often perfectly dry. Perhaps the most discouraging situation for a mechanical engineer to be called to in the anthracite coal regions is to have to provide the remedy for an old drowning mine, where the vein is large, the pitch steep, the top bad, the mine full of fire-damp, the timbers old and rotten, and the water so full of acid that it will eat up a shovel in a night, with the air so close that one can hardly breathe. On these occasions, darkness and danger are our companions, and great expense and long delay are our inevitable followers.

The first mining-pumps used were of the Cornish pattern—the old drawing lift with an iron bucket faced with leather. This leather was held in place by a wrought-iron or brass ring which nearly fitted the working barrel, and was driven full of wooden pegs. If the working barrel was made of hard iron, and the length of the rod nicely adjusted so that the leather would come slightly above the bore in the up-stroke, and if the water was clean and not acid, and the lift not too heavy—then, this is still the best mining pump ever made. The red-ash veins were the first ones worked below water-level, and the water in red-ash mines will not, as a rule, eat up iron; but when slopes and shafts had to be sunk on the white-ash veins, there the lifting-pumps would not do. The sulphuric acid in the water ate them up. Some brass

working barrels and brass rods were tried, but they were expensive and short-lived. Open-topped force-pumps were made, hoping that they could be lubricated and made to stand; but the general conclusion arrived at, about the year 1848, was, that plunger pumps must be tried. Since that time, they have been generally used, and the reason of their longer life is, that plungers can be lubricated and the corroding action of the acid water lessened. As the first lifting-pumps were worked by rods running up to the engine, quite a change in balance-boxes occurred when lifting-pumps were changed to plungers, and about this time quite a number of double-acting pumps were put in. These pumps, of course, discharged water at each pass of the piston, and had four valves instead of two. About the years 1854 or 1855, the Bull engine and pump were introduced. These did away with cog-wheels for pumping, as the pump-rods were fastened to the piston-rod of the steam-engine. No fly-wheel or crank was necessary on these engines, since the cylinder was made large enough to lift the rods, which were made heavy enough to force up the water on their downward stroke.

These engines and pumps have been a real success. They had to be very strong, from the nature of the case. The valve-gear is beautiful. It is the result of one hundred years' experience in Cornwall, whence the idea came. The engine-man has to be a man of good judgment, as he deals with very heavy weights. Yet, as regards consumption of steam, the two-valved engine of the anthracite coal region compares very unfavorably with the three-valved Bull engines of Cornwall.

About the year 1860, steam-pumps began to be used in the coal mines; the great departure being in bringing the engine and pump together; and from the unfortunate nature of the case, the engine had to be taken down in the mine from 500 to 1000 feet from the boilers. Here commenced another trouble, which is the great loss of power of the steam so conveyed.

Strange as it may seem, the old war between acid water and pistons and rods had to be fought over again, and the acid water came out ahead with steam-pumps, just as it did with lifting-pumps.

This paper must be too short to go over all the questions of steam-pumps, with their valve movements—positive, isochronal, and steam-moved—of pumps alternate and reciprocating, with bronze linings, rods, and valves; with roomy valve-chambers and easily changed seatings, etc., with air-chambers and air-lodgments; together with questions of relative size, speed, and portability. Yet I must take time to say, that to pump acid water, a plunger seems the best, because it can be protected by grease (in cold water), and the action of a piston on the lining of a pump will even hasten the corroding action of the acid water; that steam carried from 500 to 1000 feet, in pipes ever so well covered, will lose much of its power; that ordinary high-pressure steam-engines, using such steam and making no use of the principles of expansion, are great wasters of steam; that centrifugal pumps, even with short lifts, will hardly do for acid water; that the introduction of steam into vessels just emptied of cold water seems to return to the days before James Watt; that the ponderous engines of Cornwall, or the splendid examples lately set up at our American water-works, are too costly for the ever-changing locations incident to anthracite coal mining; and that while to men who daily see hundreds of tons of good culm thrown away small savings of steam seem foolishness, yet in view of the great fact that in the best steam-pumps in the coal regions the fuel used is four times as much as it might be, there seems room for improvement on that score. As the pumps now stand in the anthracite coal region, those which use the least fuel are the old plungers, worked by engines on the surface, using cog-wheels and pinions. Next in point of economy are the Bull pumps. Then follow various kinds of steam-pumps—good, bad, and indifferent. None uses the principle of expansion to a very great degree, and the duty done by 100 pounds of coal may be stated at from 10,000,000 to 20,000,000 pounds of water raised one foot high.

The pumping of the water of the anthracite mines is an ever-increasing trouble. The mine widens, the outcrops fall in, and as the quantity of coal to be had decreases, the water increases. For this state of affairs, there is no help. Some colliers in the middle coal-field use, at certain seasons of the year, one hundred tons per day for pumping water, to raise 8,000,000 of gallons in twenty-four hours from a depth of four hundred feet. When wet seasons come on, the water in the mines gets more troublesome on account of acid which is extracted from the rubbish left in the mine. The water of the mines is not good for use for purposes of condensation, because, when heated to one hundred degrees, it acts on iron with increased force. Fresh water gets more and more scarce, and water is brought long distances by pipes, and often in cars, to supply the boilers; and in some districts, good artesian wells are bored. Here, however, another troubles comes in: if the holes go down too deep, the mountain limestone is reached, and lime is more troublesome than sulphuric acid. But by mixing the two together, under intelligent care, a good water is obtained.

And so the situation is. The question that to-day troubles the minds of many engineers in the coal regions is, How had we best build our mine pumps—shall we stick to the old method of a plain steam-pump, with no expansion or condensation, because it is so handy to put in and take out? So far as the pump alone is concerned, the answer seems, Yes; but when we see the long row of boilers, and immense piles of fuel for them, it calls attention to the other side of the question. If by this imperfect sketch, the writer shall have called the attention of this society to this difficult and important question, he will be satisfied.

The last paper of the session, which we print below, was that of Mr. George N. Comly, of Wilmington, Del., on

ECONOMY IN LUBRICATION OF MACHINERY.

In large manufacturing establishments, the sum of money paid annually for lubricants is surprisingly great, and, where oil is the lubricant, the quantity wasted is a very large percentage of the total amount purchased. Being convinced that such was the case, I endeavored to ascertain the actual quantity of lubricating material used in a given time on the various machines and in the various shops connected with the establishment at which I am engaged. The result was startling, and the investigation proved that one of the most extravagant users of oil was the vertical engine used for driving the principal part of the works used for machine-shop and bridge construction, etc. The engine was nominally 60 horse-power, with 16-inch cylinder and 18-inch stroke, with an 84-inch diameter pulley, making 106 revolutions per minute; but the indicator cards were evidence of the fact that frequently 83 horse-power were produced by the engine. Owing to the fact that the engine was overloaded, the crank-shaft bearings and crank-pin gave much trouble by heating, and occasionally it was necessary to stop the engine during working hours. The expense for lubricating oils on this engine during the month of May, 1882. was at the rate of 3·53 cents per hour of the time during which the engine was actually running. The oil used was cosmo-lubric No. 2, costing 65 cents per gallon, and the specific gravity of the oil was 26 Baumé. During June, the oil cost 3·91 cents per hour run, and the engine was running 120 hours per week, or on an average of 20 hours per day. About the 1st of July, I commenced using No. 10 lubricine-grease on the crank-shaft bearings *instead* of *oil*, and the result was, that the engine shaft-bearings worked much cooler, gave no more trouble, and the cost of lubricating material was reduced to 1·15 cents per hour run. The crank-pin at this time was still using oil, and continued so doing until October 9th, when I had a copper box attached to the stub-end of the connecting rod close to the crank-pin with a ¼-inch tube connecting the box with the crank-pin bearing, and No. 4 lubricine grease packed in it. No. 10 lubricine was also applied to the guides for the cross-head, the result being that the cost of lubrication was still further reduced to 0·78 of 1 cent per hour run, and the guides and pin worked much cooler than they did previously when oil was used. A mixture of palm-grease and bees-wax in proper proportions will compare favorably in efficiency with the lubricine-grease. I have also found mixtures of bees-wax and tallow or bees-wax and suet to work very well as lubricants for shafting. The relative proportions must, of course, be made to suit circumstances.

During the past eight months, the line-shafting has been running *without oil*, depending exclusively on the mixtures such as already described. The shafting is all provided with ball and socket hanger-boxes, and the top half of the box has two cups cast in it in which the grease is packed, each having a cast-iron cover fitting closely over it to keep out the dust. This cover is chained fast by a very light chain, to prevent it from being lost or knocked down by ladders, etc. The center oil-hole, where a self-oiler is usually placed, should be stopped up with a cork to keep out dust at that point, and the use of oil is not allowed on any of the shaft-bearings where the grease can be applied.

By the regulations already described, the cost of lubricants has been reduced 44·6 per cent in the cases noted above. Means have been provided for using the grease on nearly all of the engines running at the works and on several of the heavy machines, the result being a saving of lubricant and a cool running of the journals. It is better, when applying the grease, to make large holes in the caps of the bearings (perhaps 1¼ or 1½ inches diameter if allowable), and permit the grease to be packed directly on the journal surface. Where this can not be done, a funnel-shaped cup is attached to the oil-hole, in which is a copper rod, one end of which presses against the shaft while the other end passes through a spiral spring which is tightened to the required tension by a screwed cap. The cup is filled with the grease, and the rod passing through it melts the grease by the heat caused by the friction of the copper rod on the journal, the spring being tightened sufficiently to produce the necessary friction on the end of the rod. Plain copper boxes, however, are frequently preferable with lids to keep out the dust. A piece of copper rod run through the center of the box touches the shaft, and the hole between box and shaft is made much larger than the size of the rod of copper, so that the grease can be well pushed down on to the shaft.

A brief discussion followed in which it was argued that, as the friction in using grease was greater, the increased wear and tear would more than counterbalance the money in running expenses. After the acceptance of an invitation to inspect the working of a machine for making seamless pulp barrels, the members were introduced to the gentlemen of the Cleveland Civil Engineers' Club, with whom a few hours were spent in friendly intercourse and in the discussion of a collation.

THE SECOND SESSION.

After the transaction of some routine business, including a report by the tellers, announcing the election of a number of new members, a report by the treasurer and by the council, Mr. W. F. Durfee, of Bridgeport, Conn., was called upon to read his paper on Balancing Vertical Engines, in which he gave a detailed description of a vertical high-speed engine built by him as early as 1868 for the American Silver Steel Company, of Bridgeport, making frequent reference to drawings, without which it is not possible to follow his explanations. During a lively discussion which followed, and in which Messrs. Henning, Scott, Barnet le Van, Miller, Hamilton, Sweet, and others took an active part, an interchange of opinion and of experience was had concerning a number of points raised by the paper. The merits of vertical *versus* horizontal engines, for high speed particularly, brought out facts in regard to the piston speed now attained by some of the horizontal engines of the Porter-Allen and Buckeye class, it being reported that as high as 1200 feet had been attained without affecting the working of the engines.

This was followed by the reading of a long paper written by Mr. W. E. Ward, of Port Chester, N. Y., on

BETON IN CONJUNCTION WITH IRON AS A BUILDING MATERIAL.

Noting, as early as 1867, how great was the adhesion of cement to iron, Mr. Ward gradually, and through a long series of experiments, worked up the reciprocal value of béton in combination with iron, first in construction of beams designed for supporting the floors and roofs of houses, and then for all the various portions of buildings. He built a very elaborate residence at Port Chester entirely of béton and iron. He carefully investigated the proportions of the materials composing the béton for the requirements of the different parts of the structure. For floor and roof supports, the béton is enforced by iron T beams placed near the bottom of the béton beam, so as to utilize its tensile quality for resisting the strain below the neutral axis, while the béton above this line is relied on for resisting compression. Under a load of 9500 pounds, placed in the center of a béton and iron beam 12 feet long the deflection was only seven sixteenths of an inch, the beam returning to the original line after the load had been removed. Mr. Ward suggests an inverted ⊥ beam for the iron in future works. The floors of the Port Chester building were made of a one-inch layer of béton upon which iron rods five sixteenths of an inch in diameter were placed eight inches apart, both

longitudinally and laterally. On the top of this came a two-inch layer of béton, over thirteen thousand square feet of flooring and roofing being thus constructed. For the walls, Mr. Ward recommends the thin double-wall system; and for heating the buildings, he places a large number of pipes in walls and floors communicating with a central heater, thus securing uniformity of temperature and good ventilation. The reinforced béton system has also been employed with good results in heavy foundations for stationary engines, a 250 horse-power, tandem compound engine, of very heavy pattern, having been mounted by him on a reinforced béton bed, 23 feet long, 5 feet wide, and 7 feet deep. He also mounted the out-board bearing of the main shaft on a single block of the same kind, the entire cost of the foundation chamber being less than the estimate for the same in first-class brick or stone mason work.

Mr. Ward's elaborate paper which contained many facts which lack of space does not allow us to allude to at length, excited considerable interest, remarks on its contents being made by Messrs. Barnet le Van, Root, Weightman, and Thompson.

In the absence of Mr. H. R. Towne, of the Yale & Towne Manufacturing Company, Stamford, Conn., his paper, Cranes—a Study of Types and Details, was read by a member. It is a valuable summary of the results of every practical experience, for which we shall make room in an early issue. Though long, it was listened to with close attention, and called forth an animated discussion, which added to the regrets that the writer was not present. The closing minutes of the session were occupied by an earnest but rambling speech by Mr. Thomas R. Morgan, Sr., of Morgan, Williams & Co., Alliance, O. Mr. Morgan took exception to the conclusions arrived at in important matters of detail by Mr. Towne; but in his earnest efforts to impress the members with his determination to give them facts, did little beyond reiterating the statement that a traveling crane, built by him for the Dickson Manufacturing Company, embodied features meeting all the requirements of such work. Mr. Morgan received a respectful hearing, to which his long experience and the excellent work turned out by him fully entitled him; and his promise to put on record what he had to say in the Proceedings of the society gave much satisfaction.

THE THIRD SESSION.

The adjourned discussion of Mr. Towne's paper on cranes was again taken up, Mr. W. F. Durfee, of Bridgeport, Conn., leading off with the description of a cheap traveling crane built by him, for the special purpose of removing the rolls from their housings in a train of rolls. Mr. Walker, of the Walker Manufacturing Company, Cleveland, dwelt upon the results of some investigations recently made under the auspices of the government, in reference to the winding on drums of chains, the result of which was, that the frequent breakage of chains could be averted by so arranging matters that the horizontal links did not twist.

Mr. George W. Maynard, of New York, then followed with a paper on the Bower-Barff Process, in which he summarized the data submitted in earlier papers by Professor Barff and the Bowers, father and son, and gave the latest results attained in recent American practice, the few months of active work here having led to many modifications of detail, insuring better work. This paper too brought out a lively discussion, in which Messrs. Henning, Smith, Partridge, E. D. Leavitt, Jr., Hand, Weston, and Root took part. The president, Mr. Leavitt, spoke of the difficulty he had experienced in preventing the corrosion of the brass tubes in the superheaters designed by him, in which the question of the corrosive action of sulphurous acid gas from fuel came up.

Mr. William J. Baldwin, of New York, then, in a paper entitled Standards in Pipe Fittings, made a plea for the establishment of a standard in elbows, tees, and crosses, and referred at length to the scale advocated by the late Robert Briggs. While in the main coinciding with him in the necessity of such a reform, the opinion did not seem to prevail that the appointment of a special committee to report on the subject would be the best means of agitating the subject.

Mr. William Kent, of Pittsburg, in a paper on the Relative Values of Bituminous Coals, pulled the recent report made under the auspices of Quartermaster-General Meigs to pieces, and gave some general hints as to the best method of burning, particularly those coals containing between 20 and 40 per cent of volatile matter. He submitted tables showing the results of evaporation tests made with a number of American and foreign bituminous coals in Babcock & Wilcox boilers.

Mr. C. C. Collins, of the Stearns Manufacturing Company, Erie, Pa., followed with a paper on Balanced Valves; and Prof. J. B. Webb, of Cornell University, on Reuleaux's Kinematic Models.

Before adjournment, Mr. J. F. Holloway announced that he had received a dispatch from Prof. R. H. Thurston, of the Stevens Institute of Technology, which at its commencement this week conferred the honorary degree of Doctor of Engineering on E. D. Leavitt, Jr., President of the American Society of Mechanical Engineers. This announcement was received with much applause. After a brief reply by the doctor, the meeting adjourned.

In the evening, the members attended a reception tendered them by citizens of Cleveland.

AMMONIO-PHOSPHATIC DEPOSIT IN THE VICINITY OF CAPE TOWN.—Writing to the *Chemical News*, Mr. A. B. Griffiths reports on a deposit which was found some time ago in some caves, a few miles to the southeast of Cape Town, South Africa. The deposit is in a powdered condition, and of a brown color, but contains solid nodules. These nodules present the appearance of contortions like ordinary guanos; and when reduced to powder, and washed in distilled water, and the sediment treated with acids, followed by washing in water in the usual way, a microscopical examination showed that these nodules contained a large amount of diatomaceæ, and a few sponge spicules. The powder-deposit also showed the presence of diatomaceæ. On submitting a fair sample of the deposit to analysis, it was found to contain: 70·21 per cent of ammonium compounds, 17·5 per cent of phosphates, 3·3 per cent of nitrogen, etc. Probably these deposits may furnish a very useful manure. From these observations it is most probable that these deposits consist of the more or less altered excrementitious matters of an extinct fauna.

FURNACE, MILL, AND FACTORY.

The Rosedale, Kansas, iron-works have started up for a short run. The mill is to be sold in October for the benefit of the stockholders.

The new Taylor-Langdon ore-roasting furnace, erected by W. J. Taylor & Co., at their Chester, N. J., furnace, is averaging 40 tons per day of thoroughly roasted ore.

The Dickson Manufacturing Company, of Scranton, has been awarded the contract to furnish the Calumet & Hecla Mining Company, Michigan, with a steel boiler 90 inches in diameter, 36 feet in length, and to carry 150 pounds pressure. The total weight of this boiler will be 108,000 pounds, and the castings for it will weigh 10 tons. It will have 199 three-inch tubes.

A stock company has been formed in Harrisburg, with a capital of $35,000, for the manufacture of edge tools.

The Parkersburg Iron Company, Pennsylvania, has erected a steam-hammer that weighs 47,000 pounds.

The Maumee Rolling-Mill Company, Toledo, Ohio, is building a mill which will be in operation by January 1st, 1884. The capital stock of the company is $500,000.

The new Crozer Furnace, at Roanoke, Virginia, made a very successful start on May 28th. The first cast was a gray forge of fine quality and great strength, weighing about eight tons. The daily output is expected to be from 80 to 100 gross tons.

The Shelby Iron Company, Alabama, having two blast-furnaces at Shelby, is experimenting with the Mathieu process of making charcoal. By this process the by-products are saved.

A company with a capital of $200,000 is forming at Mobile, Alabama, for the purpose of establishing a pig-iron furnace with a capacity of sixty tons daily.

The California Iron and Steel Company has just blown in its new blast-furnace at Hotaling, Placer County, Cal. The buildings are iron and have the latest improvements.

It is understood that the directors of the Puget Sound Iron Company have in contemplation the building of a large rolling-mill at Irondale, Washington Territory.

A company of Toronto capitalists is proposing the erection of blast-furnaces in that city, and has appealed to the Dominion Minister of Finance for higher duties and an increase of the promised duty of $1.50 per ton on pig-iron of domestic manufacture.

The Blakeney Foundry Company, of Springfield, Ohio, recently organized, is building extensive works at that place for the manufacture of the Blakeney cupola-furnaces and general castings.

The Missouri Malleable Iron Company, of St. Louis, Mo., has recently put its works into full operation. The works are supplied with the latest and most improved machinery and apparatus for turning out a general line of malleable castings for agricultural and other castings.

The McKenney Tubular Rail Company, of Chicago, recently incorporated, has located its works at La Grange, Lewis County, Mo., where the necessary buildings are in course of erection.

The converting-works and rail-mill departments of the Chicago works of the North Chicago Rolling-Mill Company have started up with from 700 to 800 men. All other departments of the works at South Chicago and Bay View, Wis., are in operation.

The Link-Belt Machinery Company, Chicago, is building a hay-conveyor for Hall, Warner & Co., Wellington, Ohio; one large conveyor and elevator for the Cincinnati Linseed-Oil Company, Cincinnati, Ohio; an ear-corn conveyor to go to Beloit, Wis.; one stone-conveyor for W. A. L. Thompson, Topeka, Kansas; and a grain-weighing and transferring-car for Wells, French & Co., of Chicago.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents have been promulgated from the General Land-Office under date of June 1st, 1883:

ALABAMA.

HUNTSVILLE DISTRICT.

The placer claim of Stephen E. Dobbs, De Kalb County.

ARIZONA.

TUCSON DISTRICT.

Louis C. Hughes *et al.*, Copper Queen lode.

CALIFORNIA.

MARYSVILLE DISTRICT.

John C. Gray, Good Luck placer mine.

SACRAMENTO DISTRICT.

George David Endriss, placer, El Dorado County. Christopher Buddecke, Strap Ravine placer mine, Placer County. George Nichols, placer, Calaveras County.

SHASTA DISTRICT.

Louis F. Roab, Roab & Perkins Bar placer mine, Trinity County. George Simmons and James Quinne, placer, Siskiyou County. John D. Mello *et al.*, placer, Siskiyou County.

SUSANVILLE DISTRICT.

Plumas Eureka Mining Company, Amador placer mine, Plumas County.

COLORADO.

CENTRAL CITY DISTRICT.

R. W. Knowles, Syndicate, Golden Rule, and John Sherman lodes. Pizarro Gold and Silver Mining Company, Pizarro and Pizarro Extension lodes. William W. Flagg, Atlantic lode. John Hunneau, Mary Ann lode. Charles A. Martine *et al.*, Cuba lode and mill-site. James Lotridge *et al.*, Silver Star lode. J. Wesley Miller, E. W. Lyon lode and mill-site. Lewis C. Snyder, Egyptian Side lode. Ernest Stahl, Kalamazoo lode. Ivers Phillips, placer, Boulder County. Albe M. Saxton, Keystone lode. D. J. Hutchinson *et al.*, Bonanza lode. William M. Roworth, Stewart & Company lode. Hal Sayr, Rainbow and Sans Souci lodes. Henry M. Teller, Running lode, West lode. Hal Sayr *et al.*, Valverde lode.

DURANGO DISTRICT.

Simon H. Stern, Crown Point lode. N. J. Bradley *et al.*, Uncle Ned lode.

LAKE CITY DISTRICT.

Isaac Thomas, Ophir lode. Rico Silver Mining Company of Colorado, Bobtail lode. Desire Friend *et al.*, Independence lode. C. E. Schoellkopf, Oriental lode. Thomas C. Wilson, Ben Bolt lode. Engineering, Mining, and Developing Company, Mountain Monarch No. 2 lode. David Geiger *et al.*, Monarch lode.

LEADVILLE DISTRICT.

W. G. Reid *et al.*, W. G. Reid lode. Americus L. Pogue, Galena lode. Roswell Sprague Jones, Westmoreland and Harrison lodes. Abia G. Hooper *et al.*, Governor lode. Lennox Mining and Milling Company, Kansas City No. 2 lode. Canada Consolidated Mining Company, Eva, Little Rose, Little Maud No. 2,

Little Lulu, Lady Elgin, and Little Bell lodes. Abraham Jacobs *et al.*, Why Not lode.

PUEBLO DISTRICT.

Game Ridge Consolidated Mining Company, Times lode. James A. Melvin *et al.*, New Year lode.

DAKOTA.

DEADWOOD DISTRICT.

Samuel McMaster, Little Nettie lode.

IDAHO.

BOISE CITY DISTRICT.

William H. Nye *et al.*, Idahoian lode.

MONTANA.

HELENA DISTRICT.

John McLaggan *et al.*, Simon lode. Nathan S. Vestal *et al.*, Empire lode and mill-site. Edward B. Corely *et al.*, Keystone lode. Edward Hickey *et al.*, Black Hawk lode. Thomas Cruse, North Star lode. Thomas Wilkinson *et al.*, placer, Lewis & Clark County. James D. Heald, placer, Madison County.

CARSON CITY DISTRICT.

Manuel San Pedro *et al.*, Arctic lode. Luther A. Buckner, Montgomery lode.

NEW MEXICO.

LAS CRUCES DISTRICT.

The Sterling Price Mining Company, Sterling Price and South Virginia lodes. William H. Henry and James B. Price, Johnny Bull lode. Daniel H. Moffat, Jr., forty-five patents upon the Santa Rita lodes Nos. from 1 to 31, both inclusive, and 33, 34, and 47, 48, 49, 50, 53, 54, 55, 57 to 61, both inclusive.

UTAH.

SALT LAKE CITY DISTRICT.

Sunbeam Mining Company, Lady Aspinwall lode. Martha Martin *et al.*, What Cheer lode.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

Work at the various mines continues with the usual results. No important developments have been made since our last issue.

PIMA COUNTY.

COPPER QUEEN.—The production of this company for the year 1882 from the two smelters was upward of 8,000,000 pounds, with an average fineness of 96½ per cent, and they are still running with the same degree of success.

YAVAPAI COUNTY.

NONESUCH.—This property, discovered in 1864, and named the Goodwin, in honor of Arizona's first governor, after a series of ups and downs, has at last fallen into the hands of a company which promises fair to systematically test its merits by a proper development.

SILVER JOE.—This mine is situated near the Goodwin. The ledge has been traced for over 900 feet, and wherever uncovered shows a continuous vein, from two to eight inches in width. The lode bears north and south, and has a nearly vertical descent at all points where it has been sunk on. The ore is a chloride and sulphuret of silver, containing but very little base.

CALIFORNIA.

Dispatches from the City of Mexico state that the government has ordered troops to be sent to the new gold diggings in Lower California, for the preservation of order. The prefect of the territory has been ordered not to admit locations until he receives special instructions from the federal government. The richness of the diggings has been officially confirmed.

AMADOR COUNTY.

According to the San Francisco *Stock Report*, a suit has been begun in the United States Circuit Court by the New York Mill and Mining Company, an incorporation in the State of New York, against the Amador Mill, Mining, and Tunnel Company, of California, for the possession of 600 feet of a mining claim near Middle Bar, Amador County. The complaint alleges wrongful possession. An injunction restraining the Amador Company from working the mine is also asked for.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—The mill has been stopped.

GOLD STRIPE.—Work has begun at the tunnel and stopes, in order to get out what ore is in sight there. An arrangement is about completed with John McIntyre and W. Deal, by which the ledge recently discovered by them will be made available for work in the mill.

INDIAN VALLEY.—The necessary repairs on the wrecked machinery have been completed, and work has been resumed at the mine and mill.

LUCKY S.—Prospecting-work has been kept up steadily on this claim, situated in Emerald District. The mine is now so far developed that the building of a mill will be decided upon shortly.

SUN SET.—The developments continue good. Mr. C. G. Rogers, superintendent of the Green Mountain, and J. O. Hemler, have bought a half-interest in the mine.

SIERRA COUNTY.

SIERRA BUTTES.—The company has begun the erection of a new forty-stamp mill at Sierra City. It is expected that this company will employ 100 more men than hitherto.

CANADA.

A dispatch from Montreal states that a contract has been given out for the building of the Gatineau Railroad from Ottawa seventy miles up through the district where the phosphate mines are situated. The cost will be $16,000 per mile.

NOVA SCOTIA.—One of the best gold discoveries so far in Halifax County has just been made on the old De Wolf property at Montague, close to the celebrated Rose leads. Three leads, respectively 33, 11, and 7 inches in width, have been found about twelve feet below the surface, and give indications of a rich yield.

HALL-ANDERSON.—The secretary of this company has sent us the following information: The management has changed hands, owing, it is said, to a sale of a large block of stock to a syndicate. Messrs. H. K. Adams, late president, and E. F. De Camp, late general manager, have resigned their official positions, and also retired from the directory. Mr. E. D. Davidson, late acting superintendent at the mine, was elected president. He reported the mill as in a splendid condition, and the mine itself never looking better. The last ore he crushed, and with a good return, came from the Orion Belt, and just at the beginning of a big strike.

OXFORD.—The superintendent telegraphed on the 8th that he had shipped a gold brick, value $4000, from a mill-run of six days. The ore is running richer. The Split lode, just opening, promises as well as the rich Mill lode. Prospecting just east of the company's ground shows up a new and very rich lode.

COLORADO.

BOULDER COUNTY.

Important strikes have been made in the Richmond and Three Brothers mines, situated near Salina.

CHAFFEE COUNTY.

The building of the railroad is progressing steadily; the grading of the highest and most difficult points along the route is pushed with vigor, the level and easier portions being left for later on in the work. Under such circumstances, the casual appearance of progress is deceptive to those expecting to find tracks laid and the road within the promised time, thus putting Chaffee City, which will then be known as the Monarch, in direct communication with the railroad lines of the United States.

CLEAR CREEK COUNTY.

CAMPBELL.—The managers announce the want of a sufficient amount of the right kind of ore as the cause of the delay in starting the smelter at Idaho Springs.

DIAMOND JOE.—Work will be resumed.

DIAMOND TUNNEL.—The No. 5 lode is opening an excellent streak of ore. The vein has shown continued improvement since passing the horse, and the working force has been increased. The prospects look well for a large ore-body. The Corry City veins are also showing more encouragement. Rising has been commenced on No. 2 with a streak of scattered ore, which grows larger as work progresses. No. 3 is showing ore coming in more plentifully in places across the drift heading, with evidence of being near the horse.

LITTLE JACK.—A vein of mineral, containing a great deal of gray copper, has been opened up on this lode.

MATILDA FLETCHER.—The lessees propose to sink a shaft below the lower level. It is already fifty feet down, and when it reaches a depth of sixty feet, drifting will be commenced on a good pocket of ore which has yielded largely in the upper workings in the past.

DOLORES COUNTY.

SILVERADO.—The recent strike of copper ore shows a vein two and a half feet wide. The company owns twenty-one claims and considerable other property.

EL PASO COUNTY.

There is considerable excitement in Colorado Springs on account of a rich mineral strike in the Mount Pisgah District, about thirty-five miles southwest of Colorado Springs. It is stated that there are already over one hundred prospectors at work, and others are coming in rapidly. The mineral found is said to be rich gold-bearing rock.

GUNNISON COUNTY.

MOFFET REDUCTION-WORKS.—The desulphurizing furnaces of these works at Gunnison City have been started up and are working well. The water-jacket blast-furnaces of the establishment are to be blown in shortly.

HINSDALE COUNTY.

CROOKE'S MINING AND SMELTING COMPANY.—Concentrates at the rate of 20 tons a day are stored in bins near the smelter. Drying by artificial heat has been stopped. Both sides of the concentrator are running, and will soon be delivering 40 tons of concentrates a day.

GOLDEN WONDER.—The important suit involving part of the property of the Golden Wonder syndicate, which was to have been tried in Denver, has been compromised in Mr. Alvord's favor. The owners of the property expect soon to be ready to push development and put in a stamp-mill.

OHIO CONSOLIDATED.—J. B. Downman is to take charge of this company's property. An examination of the Dolly Varden and other properties of the company will be made and assessments worked.

LAKE COUNTY.

Late Leadville exchanges report the following:

ARKANSAS VALLEY SMELTER.—Four furnaces are in blast. Numerous improvements are making at the works; and to assure a constant and desirable supply of water, connection has been made with the large reservoir of the American Smelting Company, and a new reservoir has also been constructed near the works, 80 by 125 feet, and six feet in depth.

CHRYSOLITE.—A strike of substantial dimensions is reported from the Muldoon shaft, which is developing by lessees.

ELGIN SMELTER.—The works have lately been overhauled and put in first-class running condition by the Manville Smelting Company. The establishment has begun to receive ore, and at the present time the ore-platforms contain considerable fine smelting ore, to which additions are made daily. The equipments of the smelter have been improved by the addition of a new pair of Cornish rolls, the enlargement of the ore-bins and rearrangement of the machinery generally.

EVENING STAR, AND MORNING STAR.—A body of ore of considerable importance has been opened in the Evening Star mine on the line of the Morning Star Consolidation. The mineral is a dark oxide of iron and galena, having an average value—determined by six or eight assays—of about one hundred dollars to the ton. The discovery is some distance from any of the previously opened ore-bodies in the Evening Star, and sixty feet west of any opened ground in the Morning Star. The new McHarg shaft of the Morning Star lode has attained a depth of 391 feet.

LITTLE CHIEF.—During the past month, twenty-one hand-jigs have been placed in Big Evans Gulch, a few hundred yards from the mine, and at present over one hundred tons of dump material are sent to the jigs daily. From six thousand to ten thousand tons of waste rock now encumber the premises of the Little Chief mine, a great deal of which is worthless for any other purpose than concentration. In the system adopted, this material is concentrated on an average of from ten to fifteen tons into one, and a product obtained ranging in value from 40 to 50 ounces in silver, and from 12 to 20 per cent in lead.

TENDERFOOT.—This property, whose record as a producer is yet in its infancy, is in good condition. The amounts shipped have consisted of that which was taken from the path of development without a particle of stoping, and netted thirty ounces per ton. There are upon an average four feet of hard and sand carbonates, with now and then a stringer of quartzite that carries from half an ounce to two ounces in gold. A contract has been let for the sinking of the shaft fifty feet deeper, and from that point another drift will be run to cut the body, which has already been proved up in the upper level.

PITKIN COUNTY.

Mr. Gilaspie, one of the principal mine-owners of the district, is negotiating for himself and other mine-owners of Pitkin County, for a lease and option on the Aspen smelter. The works were recently erected by a company from Texas, and are now offered for sale. The establishment is complete in every respect,

ready for blowing in at a day's notice, possessing even the necessary fluxes, coke, and charcoal. In the absence of cash capital with which to place the works on a basis for a good start, in the event they can be secured, it is proposed to form a company which shall pay its capital in ore.

Brooks, Bethune & Wemel's smelter at Ashcroft has been blown in and makes a successful test-run.

CASTLE PEAK MINING AND SMELTING COMPANY.—The machinery will not be started this season. The company owns a number of valuable properties, all of which are patented, and this year will expend its capital in development, to change them from prospects to mines.

SUMMIT COUNTY.

A letter written from Kokomo shows that the most pressing need of Ten Mile District is sampling-works. The larger mines ship their product in car-lots to the smelters at Leadville, Cañon City and Denver; but the prospector who takes out a ton or two while doing his assessment-work is practically without a market. The writer states that it is not an extravagant assertion to make, that there are to-day a thousand tons of different graded ores lying on the dumps of what are known as non-producing mines, within a radius of two miles from Kokomo, which would be brought in and sold if there was market for it. The concentrating-works of Mr. Greer are now handling about eighty tons of Robinson low-grade ores.

DAKOTA.

FATHER DE SMET.—The secretary writes, under date of May 27th, as follows: Herewith express company's receipt for bar No. 159, containing 673·40 ounces of gold, the result of run of mill for the first half of May. We have just passed through one of the worst floods that this country has ever seen. It did not injure the mine or mill belonging to this company, except causing a stoppage of the mill for three days, caving of cuts, shafts, and winzes, which we are now removing, and crushing *débris*, which will pay very little, thereby making shipments for May very light. All the roads and bridges in the hills are swept away, causing supplies to be very short and high in price. However, we are now supplied, so that the mill can be run steadily and at a profit. On the 15th inst., I drew for $18,500 for April expenses. The bullion did not leave Deadwood until the 26th inst. Ore extracted from first, second, third levels, 2840 tons. Ore milled, 2790 tons. Golden Gate north-header advanced 14 feet, making 31 feet for the month. Header in 125 feet. Tramway level rise for the month 15 feet. Rise up 74 feet.

GEORGIA.

CHESTATEE.—Thirty stamps are now running regularly, producing satisfactory results. Some trouble is, however, experienced with the water, the supply of which is not at all times as plentiful as could be desired.

COLUMBIA.—The new pump is forcing water from the Hand Ditch to the new reservoir.

FISH TRAP.—Prospect-work is continued.

IDAHO.

According to the Salt Lake *Tribune*, mining operations are progressing at Snake River. At Eagle Rock, a short time ago, some men made an apparatus for saving the fine or flour-gold, which is so plentiful in all the gravel-beds in the valley of that stream, and they have apparently solved the question of how to save this gold. Their apparatus consists simply of a sluice-box with a portion of the bottom constructed of an iron plate having numerous small perforations, for the purpose of permitting the black sands and fine gold to pass through and drop into a box beneath, while the coarse gravel, earth, etc., is washed out at the end of the box. The lower box has three openings on each side, with gates to regulate the flow into the three sluice-boxes running off at an angle from each side. In each of these are placed burlaps or gunny sacks, to catch the fine gold as it is washed along. The system has been found to work well, besides costing but little to adapt, is easily and cheaply operated. The amount of gold taken out per day with the first apparatus put in operation averaged between $20 and $25, and two men operated it.

MULDOON.—The furnaces are running on Muldoon ore, and turning out bullion steadily.

PHILADELPHIA MINING AND SMELTING COMPANY.—The company has from 15 to 20 six-horse teams constantly employed in hauling hematite ore from the Iron mine to its furnaces.

ST. PATRICK.—This mine has been sold to Baltimore gentlemen, who propose to organize a company.

MEXICO.

The smelting works at Mapimi, Durango, are reported to be the largest in the northern part of Mexico. By the aid of new machinery lately received, a capacity of 90 tons daily will be obtained.

BERNALEJO.—It is reported that a New York company has just closed negotiations for this Zacatecas mine, and will proceed to systematically develop it.

CIENEQUILLA.—The Chihuahua *Mail* states that these mines, sixty miles west of Chihuahua City, promise early prominence again. These mines were worked earlier than 1691; abandoned that year on account of the Indians; resumed operations again in 1696, and worked until 1832, when, on account of Indians, they were again abandoned. Under old-fashioned methods, immense fortunes were realized by their owners. Yet the mines were merely tinkered at until 1881, when the company now working took hold of them and actively pushed work, clearing out and developing the old shafts. It has employed sixty men, opened two new shafts and a vein that will average ten feet in width, and will soon equip the mines with the best modern machinery.

CONSOLIDATED MINING COMPANY.—This company's property, situated at Las Minas, Vera Cruz, owns about twenty-five mines of gold, silver, copper, and lead. The ores are low-grade, but abundant and easily worked. The company has been working for over a year. A Tasker pulverizer is operating and other machinery erecting preparatory to a large output.

MEXICAN INTERNATIONAL DEVELOPMENT COMPANY.—This company, which, as mentioned in our last issue, organized at Guanajuato, proposes to develop gold, silver, and other mines; to make loans on good properties; to beneficiate metals of mines belonging to the company and others; to drain mines and to do other work pertaining to the industry.

PACHUCA RIVER REDUCTION COMPANY.—The company has received two Frue vanner concentrators, which will be erected at once. The company is taking in the "tailings" from the river-bed, in anticipation of the rainy season.

ROSARIO.—The mine has been drained of water. The shaft proves to be only 250 feet deep.

ZIMAPAN COPPER COMPANY.—At a recent meeting of this company, it was resolved to send to Swansea, England, for a copper refiner and furnace builder.

MICHIGAN.

The following are the returns of the reporting mines for the month of May:

	Tons.	Lbs.
Calumet & Hecla	1837	1490
Quincy	261	40
Franklin	170	25
Atlantic	162	385
Allouez	102	985
Pewabic	70	450
Peninsula	58	600

CONGLOMERATE.—Mr. Thomas has resigned his position as superintendent. Mr. S. W. Hill will succeed him.

JOHN DUNCAN LAND AND MINING COMPANY.—The financial statement presented at the annual meeting shows cash paid in, $40,000; real estate purchased, $36,803.10; expenses, $827.59; leaving cash on hand, $2369.31.

MONTANA.

GALLATIN COUNTY.

LARD HYDRAULIC COMPANY.—The company is said to have an abundant ca work its gravel deposits, which vary in depth from 50 to 150 feet.

JEFFERSON COUNTY.

BANNER.—This mine is tapped by two tunnels, 600 feet apart, at a depth o about 100 feet from the surface. The lower tunnel is extended along the vein 300 or 400 feet, exposing a body of ore from one to three feet thick. Levels are run each way along the vein, from where the upper tunnel strike shows a strong vein of good ore.

GREGORY.—The shaft has now attained a depth of nearly 600 feet, and work is prosecuted on the 300, 400, 500, and 600-foot levels. In all of these levels, a strong vein of high-grade galena ore is exposed. The company anticipates increasing its concentrating capacity by erecting a ten-stamp battery. It also contemplates putting up new hoisting-works when these improvements are made. It is expected that the roasters and smelters will run steadily.

NELSON.—This lode is an old location, having been discovered in 1872. The ore-vein is cut by two tunnels, one tapping the lode 200 and the other 300 feet from the surface. Levels have been run from each tunnel along the vein several hundred feet.

ROBBINS.—This property adjoins the Banner on the east. It has a shaft fifty-eight feet deep; the bottom of the shaft is in good ore, of the same character as that of the Gregory.

SOLO.—The vein cuts the tunnel seventy feet from the surface. The vein is six feet wide, containing a mixture of free-milling and smelting ores, which assay well.

STANDARD.—Not much development-work has been done at this mine. Two open cuts have been run to the lode, exploring the vein twenty feet from the surface.

NEVADA.

HALE & NORCROSS.—The official letter, dated June 4th, shows that the winze is sunk to a depth of 20 feet below the 2600-foot level and three sets of timbers have been put in place. At a distance of about 8 feet down, we encountered ore on the west side of the winze, which still shows at the bottom. This ore seems to be a new stringer, east of that shown at the station level, or it may be a widening of that ore. There is some water in the winze, which is easily handled with a donkey pump. This winze water is evidently a portion of the water that we already had on this (2600) level, as there is no increase in the quantity flowing from our ground to the joint shaft.

NORTHERN BELLE.—The superintendent writes that there is no change of note in the formation on and below 5th shaft level. The southwest drift has been extended 8 feet, now in 106 feet. The streak of sulphuret mentioned last week shows an increase of width and also in value of assays from same. On 4th level, the stopes continue to look well and are yielding as usual. No change in drifts and cross-cuts on this level. In uprise above 1st, the stopes are producing some very fine ore and the outlook is quite promising. In other shaft levels, there are no changes of importance. Section of the mine above the adit presents about the same appearance as last reported. From stopes on 7th and 9th, we are extracting some ore of fair grade. Every thing is running smoothly at the hoisting-works, and all work in the mine is progressing in a satisfactory manner.

NEW MEXICO.

HUBBS'S SMELTER.—Three car-loads of rich ore have been rec ived from Silver City. During last week, there were delivered at the smelter seven car-loads of this same ore, and shipments are now on the way from the same parties. The Silver City ore will continue to be sent. The smelter would have been started up and kept running were it not for the absence of any galena ores with which the harder Silver City ores could have been smelted. Galena ore is now purchased for that purpose.

NORTH CAROLINA.

CAMPBELL MINING AND REDUCTION COMPANY.—A correspondent of the Chicago *Mining Review* announces the temporary stoppage of work on this company's tract, nine miles from High Point, and adds that it would have been better for the company to be satisfied with the exploitation of the large and productive vein on its original tract, of nearly 200 acres, instead of adding constantly by purchase, more than it was able to work.

HOOVER.—It is stated that the production so far this year has amounted to 500 ounces of gold.

UTAH.

CACTUS.—At the annual meeting, held in Salt Lake City, the following directors were elected: A. G. Campbell, A. Byran, Count d'Adhermar, Albert de Lautrippe, the latter two of Paris, France; W. H. Burnison, H. W. Morse, and H. C. Woodrow. After this election, the board selected for officers A. G. Campbell, President; H. C. Woodrow, Vice-President; H. W. Morse, Secretary; and J. E. Dooly, Treasurer. The concentrating mill belonging to this company is ready for work, and has a capacity of fifty tons of crude ore per day, with surplus power to more than double by adding more machinery. At present, twenty-five men are employed in the mine.

DALY.—This group of mines, lying west of the Ontario, comprises twenty-five patented claims, covering about 150 acres of surface. On these claims, to this date, about $78,000 have been expended, and now the property is in a fair way for production. A two-compartment shaft will be sunk at a depth of several hundred feet for the purpose of developing a vein which has been prospected by tunnels for several years, and which has been proved a distance of 5000 feet.

GREAT EUREKA.—This property is producing about thirty tons a day, which it is said will net, after paying mining and shipping expenses, $30 per ton.

HIDDEN TREASURE.—The tunnel is still driving to the lower workings. It will be remembered that it was formerly a great producer, running the old Waterman smelter at Rush Lake for several years. It was worked from the top of the hill, where the series of caves filled with ore came to the surface, and the ores run down on a wire tramway. The mine can be worked to much better advantage from the tunnel, which is expected to tap the old workings within two months.

MAMMOTH.—The difficulties at this mine, according to the Salt Lake papers, have not been settled.

TINTIC.—The mill is supplied with ore mostly from the company's mine, the Northern Spy, which produces a large amount of milling ore.

TRUE FISSURE.—This company owns the Frisco mine at Bingham, and twenty acres of placer ground adjoining. The property came into the hands of its present owners in October last. The ground had been worked last on a lease, and the lessees had left the workings in a dilapidated condition. But a comparatively small expenditure soon put the mine in working order. At present, eighteen men are at work; and it is expected to increase this force to forty or fifty as soon as the new tunnel and air-shaft are through.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, June 15.

There is nothing of interest to note in the mining market this week. Business continues to be very dull, and prices have been very irregular. Sonora Consolidated continues to be the favorite stock dealt in, and has suffered a still further decline. Decatur is another fancy largely dealt in, but its price did not materially change. Sierra Grande has been more actively dealt in than of late, but it seems to be impossible to uphold the strong prices of last week. Robinson has been almost neglected, and the price has remained steady. A complete summary of the market is given below. The total number of mining shares sold at all the Exchanges aggregates 176,418 shares, as against 196,662 last week.

The Comstock shares were quiet at about steady prices. California sold to the extent of 3150 shares at 36@42@37c. Consolidated Virginia had a small business at weak prices; it sold from 80@68c. Sierra Nevada was weak; with a moderate business, it sold from $7.88@$6.50. Union Consolidated has been strong, under moderate transactions, selling from $8.63@$9. Ophir sold at $4; Yellow Jacket at $5.13; and Best & Belcher at $5.50, with one small transaction each. Consolidated Imperial was quiet and steady at 9@10c. Sutro Tunnel was active and irregular, selling from 29@24@25c.

The Leadville stocks were but moderately dealt in, and were steady. Amie was quiet and irregular at 18@16@17c. Chrysolite had a small business at steady prices, selling from $1.15@$1.20. Iron Silver records a moderate business, and was steady; it sold from $2.90@$2.85. Leadville sold at 50c., with a small business. Little Chief was quiet and strong, selling from 49@55c. Little Pittsburg sold at 78c., with transactions of 500 shares. Climax sold at 7c.

The Bodie stocks were almost entirely neglected. Bodie Consolidated was dealt in to the extent of 1640 shares at $1@92@95c. North Standard was quiet and steady at 8@10c.

The Tuscarora stocks were quiet and steady. Grand Prize sold at 25c. Belle Isle was quiet and steady, selling at 20c., assessment unpaid, and from 42@40c., assessment paid. Navajo had a small business at stronger prices; it sold from $1.45@1.80. North Belle Isle was quiet and steady, selling from 20@25c. Independence sold assessment unpaid, and was quiet and steady at 33@30@32c. Elko Consolidated records a moderate business at steady prices, selling from 19@18c.

In the miscellaneous list, Bassick has been moderately dealt in at very irregular prices; it sold from $10@$9.25@$9.50. Caribou Consolidated was quiet and steady at 14@13c. Eureka Consolidated records a small business at strong prices, selling at $4. The Green Mountain stocks have been quiet and steady. Gold Stripe sold from 7@8c. Green Mountain sold at 73c., and Rising Sun at 3c. Homestake was quiet and steady at $15.75@$16@$15.63. Horn-Silver had a fair business at irregular prices; it sold from $6.63@$6.25@$6.38. Northern Belle has been weak, under moderate transactions, selling from $6.75@$6. Robinson Consolidated has been very quiet at steady prices, selling from 77@75c. Sierra Grande records a fair business at very irregular prices; it sold from $1.50@$1.25@$1.30, the business aggregating 7700 shares. Stormont has suffered a decline, under a small business, selling from 69@48c.

Alta-Montana was quiet and steady at 3@4c. Bradshaw was quiet at 26c. Caledonia had a small business at strong prices; it sold from 75c.@$1. Decatur records a very active business, and has been steady, selling from 5@4c. Eastern Oregon records a fair business at strong prices; it sold from 31@38@35c. Harlem was quiet and steady at $1.40. Oriental & Miller sold from 16@18c. under a small business. Rappahannock sold from 6@8c. Sonora Consolidated continues to decline under a very heavy business; it sold from 34@24@25c., with a business of 53,900 shares. State Line Nos. 1 & 4 was quiet and steady at 4@5c.

MEETINGS.

Bassick Mining Company, No. 44 Wall street, New York City. Annual meeting of stockholders and election of trustees, June 26th, at twelve o'clock M.

Great Eastern Gold Mining Company, No. 64 Broadway, New York City. Annual meeting of stockholders, June 16th, at eleven o'clock A.M.

Wide West Mining Company, No. 32 Park Place, New York City. Annual meeting of stockholders, June 16th, at twelve o'clock M.

DIVIDENDS.

The Carbonate Hill Mining Company, of Colorado, has declared dividend No. 6, of five cents per share, payable July 2d, making the total dividends declared to date, $60,000.

The Crescent Mining Company, of Utah, has declared a dividend of ten cents per share, or $50,000, payable June 20th.

The Hecla Mining Company, of Montana, has paid its regular monthly dividend (for May) of fifty cents per share, aggregating $15,000.

The Homestake Mining Company, of Dakota, has declared its usual dividend of $50,000 (for May), payable at the office of the transfer-agents, Messrs. Lounsbery & Haggin, Mills Building, on June 25th. Transfer-books close June 20th. Total of dividends to date, $1,162,500.

The Indian Queen Mining and Milling Company, of Nevada, has declared a dividend (No. 31) of one and a half per cent upon the capital stock of the company, payable July 2d.

The Kentuck Mining Company, of Nevada, has declared a dividend (No. 38) of ten cents per share, payable June 20th.

The Silver King Mining Company, of Arizona, has declared a dividend of twenty-five cents per share.

The True Fissure Mining Company, of Utah, has declared a second quarterly dividend of twenty-five cents per share, payable June 15th.

PIPE LINE CERTIFICATES.

Until yesterday, the petroleum market was dull and featureless. Throughout the week, oil has been dull, the fluctuations being very irregular. Yesterday and to-day saw better prices and a strong "bull" market.

There is but little news from the oil regions. On Tuesday, Patterson Well No. 8 was reported as good for 300 barrels the first twenty-four hours, but later news estimated it from 100 to 150 only. It is said that the patent on the Roberts torpedo expired on May 20th, and that the reduced price on this article has increased its use in the wells. The Cooper tract is said to have declined 900 barrels in production during the past week. To day's dispatches quoted Anchor Well No. 19 as having given 120 barrels the first hour. Later news, however, states that the well has declined rapidly, and is producing only 18 barrels per hour. The decline in this well, and the fact that the syndicate had made certificates scarce in Oil City, and that the loaning rate was down to thirty cents, or twenty cents below the actual cost of storage, led to-day to a firm and pronounced bull feeling, under which the market was strong.

The annual election for officers of the New York Mining Stock and National Petroleum Exchange was held on Monday last, and the following persons were chosen: President, C. O. Morris; Treasurer, John Stanton; Chairman, A. W. Peters; Secretary, P. J. Sweeny, Assistant Secretary, R. H. Gallaher, Jr.; Members of the Governing Committee, to serve one year: C. G. Fales and Julius Jahn; to serve three years: A. W. Peters, S. V. White, J. A. McPherson, J. S. Stanton, Leo Speyer, J. R. Mullany, F. F. Beals, L. V. De Foreest, and C. L. Parker; for Trustees of the Gratuity Fund, to serve one year: C. F. Woods; to serve five years: S. V. White and Henry H. Truman.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
June	9	$1.15½	$1.19⅜	$1.15½	$1.18⅜	2,480,000
	11	1.18¾	1.18⅞	1.16	1.16½	2,628,000
	12	1.16½	1.17½	1.15¾	1.16⅝	1,248,000
	13	1.16⅞	1.18⅝	1.16¾	1.17⅝	1,744,000
	14	1.17⅜	1.20⅝	1.17⅜	1.18¾	2,453,000
	15	1.18⅞	1.19⅞	1.17¾	1.19⅜	3,122,000
Total sales						13,675,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, June 14.

The market for copper stocks this week has evidently turned, showing decided improvement in several, notably Calumet & Hecla and Quincy. The fact is, prices have ranged too low for some time past, and it is quite clear that the best companies can continue to pay good dividends, even with the price of copper at 15c. Calumet & Hecla has advanced steadily from $237½@$243 bid. Even this price does not bring out the stock; it is remarkable how little of it comes on the market, the sales the past week being only four shares. Allouez seems to be an exception to the market, and finds little favor, with small sales a $1⅛. Atlantic at $11 is the first sale for over month, and the stock is in fair demand at that price. Franklin, which has remained very dull for weeks at $10, has become quite active again, advancing to $10½. Of Huron and National, there are no sales, nominally $1⅛ bid. Osceola declined from $20½@$19¼, ex dividend 50 cents, payable July 1st. This company has heretofore paid $1 per share quarterly—now reduced one half. Pewabic, without sales previous to this week, since May 22d, at $3, has started into life again, advancing to $4, and same bid. The accounts from the mine continue encouraging, and it is among the possibilities that this company may "strike it rich" almost any time at very short notice. Quincy, which was working up a little last week, and had gained from $44@$45, farther advanced to $50, with a good demand for the stock through the week. The general expectation that this company will divide $3 per share in August gave strength to the stock, and the upward price has been accelerated by the forcing of a short interest to cover.

In silver stocks, there is a better tone, without any great activity. Bowman is assuming prominence, and advanced from 17@22c. The stock is very strong as it moves up, and it would not be surprising to find it selling at 50 per cent advance on the present price within a few weeks. Sullivan suddenly dropped from $1⅞@$1½, at which 500 shares were put out; later, it is back to $1⅞, and the same bid. Catalpa, which had been exceedingly quiet for some weeks, with scarcely any sales, has suddenly started up from 65@70c. Crescent follows in sympathy, and has reached 30c. The improvement in both is due to the better prospects at the mines, assisted by a speculative movement. Bonanza has advanced from $2¼@$2½; and later, $2⅝ bid. The agent of this company is now in England, on a mission to sell a portion of its property, which, if successful, should greatly enhance the market value of the stock.

3 P.M.—The market this afternoon continues firm, and prices are well sustained. There were large sales of Catalpa (3550 shares) at 65@70c., closing at latter rate bid. Calumet & Hecla, $243 bid. Franklin, $10¼. Pewabic, $4. Quincy receded to $49½, and was offered at that. Silver Islet sold at $4, and same bid, but the stock seems to have few friends.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. June 8.	June 9.	June 11.	June 12.	June 13.	June 14.
Albion	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Alpha	.. ..	2½	2⅞	.. ..	3	.. ..
Alta	.80	.80	.75	.80	.80	.75
Bechtel	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Belcher	1⅝	1¾	1⅞	2	1¾	1¾
Belle Isle	.. ..	.. ..	.20	.20	.20	.10
Best & Belcher	5½	5¾	5¾	6	5½	5½
Bodie	1⅛	1	1⅛	1	1	1
Bullion	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
California	.35	.40	.40	.40	.40	.40
Challar	3⅝	3¾	3¾	3¾	3½	3¾
Con. Virginia	.70	.75	.80	.80	.75	.70
Crown Point	.. ..	1⅜	1¾	2¼	1⅜	1¾
Elko Cons	.20	.20	.. ..	.20	.20	.. ..
Eureka Cons	3	2	.. ..	.. ..	3½	3
Exchequer	.45	.50	.50	.60	.55	.50
Gould & Curry	3⅝	3⅞	3⅞	3⅞	3⅝	3¼
Grand Prize	.45	.40	.25	.30	.15	.20
Hale & Norcross	8¼	8½	8	8½	7¾	7¾
Independence	.35	.35	.. ..	.. ..	.35	.35
Martin White	.. ..	.. ..	.. ..	5	.. ..	.. ..
Mexican	4⅝	4⅞	4¾	5	4⅝	4⅝
Mono	.. ..	.. ..	.. ..	10	.. ..	.10
Mount Diablo	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Navajo	1½	.. ..	1⅝	1⅝	1⅝	1⅝
Northern Belle	7	7	.. ..	6½	6½	.. ..
North Belle Isle	.. ..	.. ..	.20	.20	.. ..	.20
Ophir	3½	3⅝	.. ..	3¾	3¾	3⅝
Overman	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Potosi	1⅝	1½	1½	1⅝	1½	1⅝
Savage	2¾	2¾	2¾	2¾	2¾	2¾
Scorpion	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Sierra Nevada	7⅝	8⅝	7⅞	7¾	7	6⅞
Silver King	11	.. ..	10⅝	.. ..	10⅝	10⅝
Tip-Top	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Union Cons	8¾	9½	8¾	9¼	8⅞	8
Wales Cons	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Yellow Jacket	4¾	4¾	5	5½	5	4¾

The following are the financial balances of the various mining companies on June 1st:

CASH ON HAND.

Alta	$28,875.09	Hale & Norcross	$17,087.61
Albion Con	54.93	Jackson	2,276.87
Argenta	3,519.58	Lady Washington	59.83
Belcher	26,750.36	*Martin White	1,907.97
Benton Con	6,488.66	Mono	3,044.85
Bechtel	241.96	Mexican	31,557.64
Bodie Con	41,334.99	†Northern Belle	63,746.65
Bulwer	12,229.97	Ophir	25,960.73
California	14,809 93	Occidental	6,629.09
Con. Virginia	35,074.34	Potosi	4,873.05
Chollar	38,984.12	Scorpion	6,231.57
Crown Point	22,161.27	Savage	22,735.53
Challenge Con	5,160.23	Standard	98,754.72
Con. Imperial	396.26	Sierra Nevada	59,104.60
Day	5,519.85	Silver Hill	2,547.14
Gould & Curry	12,349.04	Utah	750.50

INDEBTEDNESS.

‡Albion		Grand Prize	$11,879.04
Best & Belcher	$7,802.41	Utah	3,548.23

*Mine expenses for May not received.
†Unsold bullion, $55,000.
‡Exact amount not yet known; approximates $260,000.

BULLION MARKET.

NEW YORK, Friday Evening, June 15.

The London market is steady and somewhat firmer, but rather inactive, and sterling exchange here is likely to decline the coming week, thus probably neutralizing any advance in silver abroad.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
June 9.	50 1-16	109⅝	June 13	50⅛	109¾
11.	50 1-16	109⅝	14	50⅛	109¾
12.	50 1-16	109⅝	15	50⅛	109¾

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of May.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$320,419
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"		17,775
Bodie, G. S.	Cal	9,248	100,590
Bodie Tunnel, G.	"	6,128	51,447
*Bonanza King, G.	"		199,077
*Boston & Montana, G.	Mont.		72,318
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah		92,654
*Chrysolite, S. L.	Colo.		142,238
*Contention, S.	Ariz.		383,014
Crescent, G.	Cal.		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak.		120,231
*Derbec Blue Gravel, G. S.	Cal		31,844
*Father de Smet, G.	Dak.		127,985
*Frisco M. and S. Co., G. S. L.	Utah		$77,084
*Head Center Cons.	Ariz.		6,865
*Head Center and Tranquillity	Ariz.		18,486
*Hecla Cons., G. S.	Mont.		234,984
*Homestake, G.	Dak.		330,060
*Hope, S.	Mont.		20,574
Horn-Silver, S. L.	Utah	228,000	1,283,000
*Independence, G. S.	Nev.		34,722
*Kentuck, G. S.	"		8,237
*Lexington, S.	Mont.	109,629	530,833
*Little Pittsburg, S. L.	Colo.		22,873
*Marguerite, G.	Cal		33,200
*Martin White, G. S.	Nev.		136,317
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev	52,233	127,311
*Navajo, G. S.	"		281,626
*North Belle Isle	"		1,953
Northern Belle, S.	"	45,510	388,525
*Ontario, S. L.	Utah		807,695
*Oxford, G.	N. S.		21,324
*Phœnix, G.	S. C.		43,666
*Pinal Cons., S. L.	Ariz.	25,540	163,400
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		101,241
Standard, G.	Cal.	71,313	442,796
Star, S.	Nev.		27,095
*Stormont, S.	Utah	21,377	95,658
Syndicate, G.	Cal.	5,987	20,073
Tintic M. and M. Co.	Utah		7,032
*Tip Top, S.	Ariz.		‡22,983
*Tombstone, G. S.	"	76,600	‡322,830
Yellow Jacket, S.	Nev.	30,191	183,064
Total amount of shipments to date			$7,734,828

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended June 15th, as compiled from various sources, amounted to $151,000, as against $174,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,560,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended June 9th	$99,823
Corresponding week last year	2,526,451
Since January 1st, 1883	5,945,784
Corresponding period last year	31,683,999

Imports.

Week ended June 9th	$26,144
Corresponding week last year	62,096
Since January 1st, 1883	6,739,083
Corresponding period last year	1,794,749

Foreign Bank Statements.—The governors of the Bank of England, at their regular meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £569,000 bullion, and the proportion of its reserve to its liabilities was raised from 35¾ to 39¾ per cent, against 44⅛ per cent at this date last year. June 14th, the bank made a further gain of £170,000 bullion on balance. The weekly statement of the Bank of France shows losses of 3,400,000 francs gold, and 675,000 francs silver.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 15.

The Board of Managers of the Metal Exchange has adopted floor rules, to take effect on June 25th, providing for a daily call at eleven o'clock A.M.

American Pig.—On Monday, American Pig opened weak at prices quoted last Saturday, $20 for No. 1, and $19 for No. 2, standard brands; but during the week there has been a large turn-over, and the leading Lehigh brands are held firm at $22 for No. 1, and $20 for No. 2, although there are some outside makes that are still quoted at lower prices. Forge has been fairly active at the range of $17.50@$18.50. Bessemer is unchanged in price.

Scotch Pig.—The market is still very dull, prices for American being far below the importing point, and arrivals have been going into store to a considerable extent. Warrants are cabled to-day at the Exchange 47s. 1d. On June 13th, the Glasgow quotations received at the Exchange were: Coltness, 61s. 6d.; Langloan, 61s.; Summerlee, 59s. 6d.; Gartsherrie, 57s. 9d.; Glengarnock, 53s. 9d.; and Eglinton, 47s. 9d.

Rails.—Steel rails have ranged from $37.50 for large lots of heavy sections to $40 for light. The consumptive demand continues good, although no very large orders are placed. The quotations to-day are $37@$38. England cables, £4 12s. 6d.@£4 15s. f. o. b.

Old Rails.—Old rails have again been dull except for a lot of 8000 tons sold by the New York, Ontario & Western Railroad, to go to Pittsburg, at $22.50 delivered there. This price is net to the sellers, the buyers paying the small brokerage, said to be $100 for the lot. Other small lots, aggregating about 350 tons, have been sold at $22.50, Jersey City.

Scrap continues nominal at prices quoted last Saturday, $23.50@$24. There is no business doing.

Philadelphia. June 14.

This week's sales of pig-iron do not foot up very largely. Standard brands are developing a little unexpected firmness, because of some quiet selling that has been going on for future delivery. A good deal of inferior iron is offered, but not much is selling; offers of 500 to 1000-ton lots continue to be made. Quotations are weak all around, except in the case of standard and special brands, concerning which makers refuse to make concessions. To-day's prices are for No. 1 at shipping port, $20@$21. Good iron can be had at $20. An effort is making by some holders to adhere to $21. The panicky feeling which prevailed last week has partly blown over, and several prominent makers have announced that, if they can not have better prices, they will hold on until the weak holders have got out of the way. No. 2 Foundry iron is selling at from $19@$20, with $17.50 at furnace as inside figures, and numerous offerings. Forge iron is selling more freely than any other, owing to the continued demand for finished iron and the low prices prevailing. The lowest prices heard of are $17 at furnace, or shipping port prices, $18@$19. Large lots continue to be offered, but there are few takers. Prices have undoubtedly reached the lowest limits, but consumers feel that it is safe to continue the policy of hand-to-mouth buying for a little while longer. Bessemer iron is to be had at $21; very few sales are heard of. Spiegeleisen can be had at $31; several inquiries are floating around.

Muck Bars are in moderate supply at $34@$34.50; and last week's reported sales foot up about 1000 tons for prompt and future delivery.

Blooms.—Several small sales of Charcoal Blooms took place at figures varying from $58@$61. Prices have been improved recently by the restriction of output. Sales of Anthracite Blooms have been heard of from $50@$53.

Manufactured Iron.—A little weakness has been developed within the past few days, though the best makes are held firmly at 2·20c. at mill. Store deliveries are large, and 2·25@$2·30c. is had in most cases. Some of the mills are short of business, and a more active competition is developed, which results in offers of 2·10@2·15c. for good iron. More or less business is coming to hand in country mills, and common iron is booked at 1·90@2c.

Nails.—A large demand continues for nails, and prices are firm at $3@$3.10.

Plate and Tank Iron.—Plate and Tank Iron are active in small lots at 2·40c. for Angles; 3½c. for Beams and Channels. Structural iron shows no additional activity, though there is no falling off in the work at mills.

Steel Rails.—This week's business is restricted mostly to small lots, though there are inquiries for large lots, and offers of $37.50.

Old Rails are scarcely heard of. Occasional offerings are made at $22.50 for shipments. Double Heads are nominal. Scrap-iron sells in small lots at $23@$25. Cast, $17@$18, and offers of cargo at $24.

Pittsburg. June 14.

Pig-Iron.—Numerous indications point to a suspension of iron-making in a good many of the mills, ostensibly for the purpose of repairs, but in reality to wait for orders. The effect of the recent signing is now developed in this way, that large consumers are waiting for lower prices, because of the assurances given during May that, without a restriction of production, prices would decline. They are now looking for that decline. The consumption of iron has not increased, and will not, unless consumers are satisfied that lowest prices have been reached. Several furnaces have recently blown out, and this helps the trade. Forge iron is offered at $17@$18, and Foundry at $19.50@$21. Most of the sales are in from 50 to 300-ton lots; 1000-ton lots of Forge have been asked for, but current prices will not be paid, consumers preferring to buy from hand to mouth, rather than risk heavy purchases. Bessemer iron sells in small lots at $21.50; for large lots, $21 is offered. Consumers of crude iron are looking for weak holders, and are occasionally finding them. One thousand tons of Muck Bar in small lots sold at $34@$34.50. Merchant Bar is selling at 2c., but buyers are holding off for 1·80c. and 1·90c. rates. There is a feeling of apprehension that the threat of weakening prices is made with good reason. Nails are in active demand at $3@$3.10 in car-load lots, 60 days. Stocks in first hands are very low, and orders for assorted are filled with difficulty. Steel rails are quoted at $39@$40, but business is done at less. The declining tendency is at work, but mills here will not be the first to sell below current rates. The general situation is quite satisfactory. The steel mills continue to make a full output. The smaller manufacturing establishments are nearly all busily engaged.

The coke trade is endeavoring to escape from the toils of over-production through organized action. The demand for iron through the oil country is steady. The receipts of scrap-iron and old rails are barely sufficient to meet requirements. Boiler-works, bridge-works, locomotive-works, and the large machine-shops have not reduced their force of hands or the volume of work turned out.

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE												SALES.
	June 9.		June 11.		June 12.		June 13.		June 14.		June 15.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.													
Amie Con., Co.			.17		.18	.16	.16		.17				5,600
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.	9.13		10.00	9.50	9.50		9.50		9.25		9.50		510
Belle Isle, Ne.	.20				.41				.42		.40		1,500
Bodie Cons., Ca.			1.00		1.00						.95	.92	1,640
Breece, Co.													
Bulwer, Ca.													
California, Ne.	.40	.36	.42		.42	.38	.40		.39	.37			3,150
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.	.14	.13											1,900
Chrysolite, Co.			1.15						1.20		1.20		1,000
Cons. Va., Ne.	.80	.72			.79	.74	.76		.72	.70	.70	.68	4,200
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.	4.00				4.00								350
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.					.10		.09						600
Gold Stripe, Ca.	.08	.07											200
Gould & Curry, Ne.													
Grand Prize, Ne.									.25				200
Great Eastern, Dk.									.01				1,000
Green Mountain, Ca.									.73		.73		800
Hale & Norcross, Ne.											7 13		100
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.	15.75				15.75						16.00	15.63	370
Horn-Silver, Ut.	6 63	6.25			6.50	6.38			6 38		6.38	6.25	2,270
Rukili, Co.													
Independence, Ne.					.33	.30			.30		.32	.30	800
Iron Silver, Co.					2.90		2.85						300
La Plata, Co.													
Leadville C., Co.							.50						300
Little Chief, Co.	.49		.50		.50				.55	.51	.55	.53	1,500
Little Pittsburg, Co.					.78				.78				500
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	1.45						1.70				1.80		500
Northern Belle, Ne.			6.75		6.50		6.00						320
North Belle Isle, Ne.	.25	.20											390
Ontario, Ut.					25.75	25.00					25.00		413
Ophir, Ne.							4.00						50
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.					37.50								100
" Com., Ca.									7.50				50
Rising Sun, Ca.	.03												100
Robinson Cons., Co.	.77		.77	.75	.77	.76	.76		.76		.75		3,800
Savage, Ne.							2.75						100
Sierra Grande, N. M.	1.50	1.40	1.30	1.25	1.40		1.40		1 45	1.40	1.45	1.30	7,700
Sierra Nevada, Ne.	7.88				7.75	7.25	7.25				6.63	6.50	855
Silver King, Ar.													
Spring Valley, Ca.													
Standard, Ca.													
Stormont, Ut.	.60				.55		.29		.50	.48			2,000
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket			5.13										50

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	June 9.		June 11.		June 12.		June 13.		June 14.		June 15		
	H	L.	R.	L.	H.	L.	H.	L.	H.	L.	R.	L.	
Advance.													
Albion													
Alta													
Alta-Montana, G.	.03				.04				.04				1,100
Am. Flag, S.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & Belcher, G. S.					5.50								50
Big Pittsburg, S. L.													
Bondholder													
Bradshaw, S.							.26						300
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G.													
C'lav'r's W. & M. Co.													
Cal., B. H., G.	.75		.80		.80						1.00		500
Central Ariz'na, S.	.25												50
Cherokee, G.													
Climax, Co.					.07								100
Cons. Imp'ri'l, G. S.	.09										.10		200
Crowell, G.													
Dahlonega, G.													
Decatur	.04		.05	.04	.05	.04	.03	.04	05	.04	.04		19,600
Dunderberg													
Durango, G.													
Eastern Oregon	.33	.31	.34	.33	.35	.34	.36	.35	.37	.35	.38	.36	6,100
Elko Cons.	.19	.18	.18										2,600
Enterprise													
Fannie Barrett													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.40		1.40				1 40		1.40				1,100
Hortense, S.			.11								.09		800
Lacrosse, G.							.11						700
Lucerne													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.													
Miner Boy													
Mono													
North Standard, G.			.06				.10						200
N. Horn-Silv'r, S. L.													
Ori'nt'l & Miller, S.			.16		.18								700
Quartz Creek													
Rappahannock, G.			.08	.07			.07	.06			.08		4,600
Red Elephant, S.							.05						500
Ruby, of Arizona													
Silver Cliff, S.							.19						600
Sonora Con.	.34	.29	.34	.30	.31	.26	.29	.27	28	.25	.26	.24	53,900
South Bodie, G.													
South Bulwer, G.													
South Hite									.10				700
South Pacific													
State Line, 1 & 4, S.	.04										.05		1,600
" Nos. 2 & 3, S.													
Sutro Tunnel	.28	.27	.29	.25	.26		.27	.25	.25	.24	.25	.24	33,600
Taylor Plumas					.02								
Unadilla, S.					8 75		9.00	8 88					1,000
Union Cons., G. S.	8.63												600

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 45,218. Non-dividend shares sold, 181,200.

BOSTON MINING STOCKS.

	June 8.		June 9.		June 11.		June 12.		June 13.		June 14.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez							1.88						25
Amie	.16												500
Atlantic	11.00								11.00				80
Aztec													
Bodie Con.													
Bonanza D.			2.25		2.38		2.50¼	2.50					500
Bowman Sil	.17		.17		.18	.17	.20	.18			.23	.20	18,622
Bruns. Ant.							15.00						100
Bulwer													
California													
Cal. & Hec.			241										4
Catalpa	.56	.52	.55		.60	.54	.57½		.60		.70	.60	9,775
Central Ariz													
Cherryfield													
Co. Virginia													
Copper Falls													
Copperop													
Crescent							.30				.31	.27½	1,050
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas							1.00						300
Duncan													
Dunkin													
Empire													
Eureka Con.													
Franklin			10.00				10.00				10.50	10.25	650
Hancock G.													
Harshaw	6½				.56¼	.50							250
Huron													
Independ'ce													
Indian Q'n.	1.25				1.15								400
Mammoth													
Mass. & N. M.	.07		.07		.07		.07				.07		9,110
Milton													
Napa													
National													
North. Belle													
Ontario													
Osceola			20.50						19 50				27
Penn-Breck.													
Pewable							3.50				4.00	3.50	95
Pine Tree							.08	.06			.12		600
Plymouth													
Quincy	46.50	46.00	46.50		47.50	46.50	48.00		50.00	48.00	49.50		404
Ridge													
Robinson													
San Pedro	.40	.35											257
S'ra Nevada													
S'ra Grande													
Silver Islet											3.00		100
Silver King													
Simpson Gd													
So. Pacific													
Standard													
Sullivan	1.88	1.75			1.75		1.50				1.88	1.75	1,610
Sutro Tun.	.28	.27			.27		.27				.26		1,600
Sycamore													
Twin Lead.	.18	.13	.18		.19	.18					.16		9,700
Vizina													

PHILADELPHIA MINING STOCKS.

	June 8.		June 9.		June 11.		June 12.		June 13.		June 14.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
Amer. Cons.													
Argent	.17	.16	.17				.18	.17	.17	.16	.16		8,500
Arizona So.			.27½								.42½	.40	1,100
Battle Mt.					.04								4,000
Buena	.01				.01		.01					.01	6,100
California													
Calista													
Chrysolite													
Cincinnati			.12								.12	.10	1,900
Comprom'e	.21		.22		.20		.24	.19	.25		.23		15,000
Contention													
Con. Virg													
Dauntless													
Del Monte													
Denver City												.13	200
Eureka													
Girard	.05				.06						.05		4,400
Governor	.08		.08		.08		.08		.08		.06	.05	14,700
Grand Uni'n			.23										1,000
Green Mt			.72½										700
Gunnison	.52½	.50	.55	.50	.52½	.40	.50	.47½	.45	.40	.42½	.40	23,600
Homestake													
Horn Silver			6.50										100
Iowa Gulch	.09	.08	.08		.08		.09		.08		.09	.08	5c,900
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd					.05		.05						4,500
Little Maud													
Little Pitts													
L'g & D'y H													
Montana													
Mt. Sheridan	.04												700
Navajo													
North'n B'l													
Orion													
Orion Pref													
Palmetto E.													
Pembina													
Penn-Breck.	.10		.10		.10		.10	.09	.09	.08	.09		19,800
Permanent					.03								7,0 0
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis			.30		.32½		.35		.32½				5,500
Rara Avis E.	.11		.10		.10		.10		.09		.09		8,700
Record													
Rico Pion'r													
Sierra Apac.	.45	.40	.45	.42½	.42½	.30	.35	.32½	.30	.25	.30		15,900
Sierra Bella.	.85	.80	.85		.70	.50	.65	.62½	.57½	.55	.60	.55	12,050
Sierra G'nde	1.60	1 52½	1.50	1 35	1.35	1.17½	1.42½	1.35	1.37½	1.35	1.35	1.30	20,000
Sierra Nev.													
Silver Cord	1.80		1.80		1.80								1,300
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana	.04				.04		.04		.04		.04		5,000
Sutro Tun'l.													
Tombstone			.80				.80						1,000
Victor	.02								.02				3,000
Yale Mt.													

METALS.

NEW YORK, Friday Evening, June 15.

Copper.—On further inquiry, we hear that the sale of Lake Copper referred to in our last week's report, of 20,000,000 pounds, was made to manufacturers only. The price paid is understood to have been 15c. without cask, on the dock, the sellers binding themselves not to sell another pound to consumers under 16c. until November 1st, next, while they are at liberty to sell for export at any price they choose in the mean time. Since then the market has been quiet at 15@15¼c. for Lake, and 14@15c. for other brands. By cable, we hear from London that copper there is steadier; Best Selected, £69@£70, and Chili Bars £63 15s.@£64 5s. We hear from Liverpool that large quantities of argentiferous copper ores and matte from Montana arrive there all the time. Of the former a contract was completed recently for about 6000 tons, delivery to be spread over twelve months; and parties were in treaty early this month for a further 2000 to 3000 tons. Large sales have also been made of matte from Montana, 280 tons selling toward the close of May for immediate shipment from here at a very full price. It is added that the course of the copper market in England depends almost entirely upon the supplies that may be received from this country. Prices over there are for the moment upheld by speculation. Whether these speculators are financially strong enough to continue doing so for some time longer in the face of amounts yet to come forward from the United States, the next few weeks will show. As for the Chilian export to Europe, it has been light enough, from January 1st to May 27th, 18,878 tons, against 19,357 last year. Spanish exportation for the first quarter has been 148,059 tons of copper ore, against last year 147,078, and 5954 tons of ingot copper, against 6120 in 1882.

Messrs. Richardson & Co., of Swansea, quote, under date of June 1st, ores and regulus 12s.@12s. 7½d. per unit.

The private sales at Swansea during the month of May consist of 382 tons of Concordia ore at 12s.; 435 tons of Bolivian ore at 12s.; 500 tons of New Quebrada Yellow ore at 12s.; 1179 tons ruby ore and 936 tons regulus at 12s. 3d.; 1086 tons of Libiola ore at 12s.; 54 tons of Mount Perry at 12s., and 20 tons at 12s. 4½d.; 105 tons of Moonta ore at 12s. 3d.; 750 tons of Cueva de la Mora precipitate at 12s. 6d.; 18 tons of Aljustrel at 12s. 3d.; 506 tons of Chili regulus at 12s. 6d.; 1100 tons of Cape ore at 12s. 4½d.; and 954 tons of Rio Tinto regulus at 12s. 6d.

Messrs. James & Shakespeare, Liverpool and London, have published the following statistics of copper in England and France, including metal afloat on May 31st:

		May 1 to 31.—Imports. Tons.	Deliveries. Tons.	
Fine foreign, chiefly Australian		1,126	1,177	London.
Chili.	Bars and ingots	1,748	1,935	Liverpool and Swansea.
	In ores and regulus	1,108	1,256	
Precipitate and sundries		2,496	3,445	
Totals, England		6,478	7,807	
Fine foreign, chiefly American		460	430	France.
Chili bars, ingots, and Barilla		993	1,361	
		7,931	9,598	

		Stocks.—May 31. Tons.	May 15. Tons.	April 30. Tons.	
Fine foreign, chiefly Australian		4,215	4,458	4,266	London.
Chili.	Bars and ingots	24,734	24,976	24,921	Liverpool and Swansea.
	In ores and regulus	1,813	2,040	1,955	
Precipitate and sundries		3,288	4,475	4,237	
Totals, England		34,050	35,949	35,379	
Fine foreign, chiefly American		140	110	110	France.
Chili bars, ingots, and Barilla		2,012	2,092	2,380	
		36,202	38,151	37,869	
Advised by mail and telegram:					
Chili		9,158	9,770	9,719	
Australian		1,650	1,650	1,950	
		47,010	49,571	49,538	

		Jan. 1 to May 31.—1883. Tons.	1882. Tons.	1881. Tons.
Imports	Chili	17,884	16,881	14,099
	Other foreign	17,415	14,166	14,735
		35,299	31,047	28,804
Deliveries	Chili	16,807	19,018	17,930
	Other foreign	17,417	13,228	12,079
		34,224	32,246	30,009

Tin has gone on weakening in our market. The market has ruled somewhat more active at a lower range of prices. Transactions for forward delivery have occurred at 21c. for cash. In large lines, spot, we quote 20¾@20⅞c. nominally. London has declined to £94, spot. Singapore cables £95 10s., cost and freight to New York. The Straits exported to England and America during the first five months, 6110 tons of tin, against 5100 tons same time last year.

Lead.—Sales have been made during the week of 300 tons Aurora corroding at 4·42½c., and 300 tons Common at the same price; subsequently, 200 tons corroding sold at 4·45c. We quote both 4·40@4·50c. at the close, on a firm but dull market. There is a good demand for common lead, deliverable in July, August, and September, consumers being anxious to secure a supply for the opening of the campaign; for current requirements, they are sufficiently stocked. Holders meanwhile show little inclination to meet the views of buyers for the months named, and in this manner little occurs for the present. At any rate, the impression is, that at about current figures lead is safe enough for some six weeks to come. London cables a weak market, at £12 15s.@£13 for English pig. Spain exported, during the first quarter, 29,534 tons of pig-lead, against 28,527 in 1882, and 25,370 in 1881.

Messrs. Everett & Post, of Chicago, send us the following dispatch to-day:

Our market is firmer. Sales are reported of 1000 tons Common at 4·15c., and of 700 tons Refined at 4·20c. The market closed strong at 4·20c.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is firm. Sales for the week are over 450 tons of Refined at 4·13c., and 70 tons of Hard lead at 4·10c. Sales to-day are 140 tons of Refined at 4·15c.; 150 tons of Chemical at 4·12½c.; and 500 tons of Refined, July delivery, at 4·18c.

Spelter is featureless; very small transactions at 4·60@4·70c. in small lots, Common Domestic, while Silesian is nominally worth 5½c. Meanwhile a firmer market is reported by cable from London, where ordinary, at shipping ports, is worth £15@£15 5s. Spanish Calamine exportation during the first quarter has been 4802 tons, against 8616 in 1882, and 2091 in 1881.

Antimony is dull at 10⅝c. for Cookson's, and 9⅝c. for Hallett's. On June 1st, French Star Regulus was worth in the London market £39@£40 per ton.

Quicksilver.—We perceive that the export from Spain has fallen off considerably during the first quarter, being only 185 tons, against 520 tons last year same time, and 698 in 1881.

COAL TRADE REVIEW.

Anthracite.

NEW YORK, Friday Evening, June 15.

There are no new developments since our last issue, nor any improvement in the general condition of the trade. The anthracite trade at present is a puzzle to the most intelligent observer. The sanguine lay much stress upon the fact that the output at the present time is practically 1,500,000 tons ahead of last year, and that the requirements for the rest of the year will be as great as for the corresponding period last year, which would bring the total tonnage for 1883 to 30,000,000 tons or over. It seems to be a fact, also, that the large companies are maintaining prices, while the choicer Lehighs and special brands of coal are handled at circular rates without any difficulty. Outside of these, however, large quantities of coal are offered at prices that are more a matter of barter. Notwithstanding these favorable factors, buyers remain apathetic. There is no snap in the trade. The demand for manufacturing purposes is largely abridged, while dealers do not seem disposed to lay on freely, notwithstanding the threatened advance on the 1st of July, which, as far as we can learn, has not yet been definitely decided upon. In our judgment, there is nothing in the present condition of the market to warrant an advance. We apprehend it would slacken rather than stimulate sales; the only probable effect would be to move coal sold at previous figures. By an ill-advised advance, the months of July and August may be made very quiet months for new business. While we recognize the fact that in the near future anthracite will be in a position to be sold arbitrarily, that day is not yet. The time is coming when it will be used only for domestic purposes, and the demand for coarser uses supplied by the practically inexhaustible quantity of bituminous. The present intense rivalry between the different contending soft coal-fields for trade, and their ability to put coal in the market at very low figures, as shown by some of the recent contracts, admonishes anthracite not to rear its head too high at present on the manufacturing sizes, or it will open the way for its active competitor to slip in and supplant it largely.

Since the above was put in type, we learn that the companies are in consultation upon the subject of an advance, and have set the figures at 10c. on broken, 15c. on egg, and 25c. on stove and chestnut. We can not learn, however, that a definite conclusion has been arrived at.

BITUMINOUS.

In bituminous, there is very little current business doing, although last week witnessed the award of the last remaining contract of importance in New England, the Boston & Maine purchase of fifty thousand tons having been divided between the Consolidation Coal Company and the Elk Garden District. It is reported that the price made was an extremely low one, so low as to justify the report that has been for some time current that the Baltimore & Ohio Railroad has finally recognized the necessity of a cut, private or otherwise, in its rates. It is evident that the future of the bituminous interests, for some time at least, will witness a continued, if not increasing, competition, and that the carriers of this coal must accept the inevitable conclusion that the day of high freight rates is passed. At this juncture, it becomes of interest to anticipate what course will be adopted by the Chesapeake & Ohio Canal Company. The confidence with which those in charge of that work started out at the first of the season with unnecessarily high charges must soon give place, if all signs do not fail, to serious doubts as to whether that work can survive the present and coming competition. It is clear, at this time, that important reductions must be made in the cost of transporting coal via this outlet. At a meeting of the Board of Directors of the Chesapeake & Ohio Canal Company, held in Baltimore on the 13th inst., it was determined to make a present reduction in the canal tolls of ten cents per ton, or from fifty to forty cents, including the charge for wharfage at Cumberland, for which a charge of four cents is now made, leaving the net tolls thirty-six cents per ton. While the reduction now made can not be said to be of any importance, it is at least agreeable to note that the Canal Company has abandoned the attempt to compel the trade to pay a charge for the use of the outlet lock at Georgetown, whether it was used by shippers or not.

The Cumberland District seems to be in the least favorable position of any of the competing interests in the existing and coming strife for trade. With the Pennsylvania Railroad on the north and the Chesapeake & Ohio Railroad on the south, fully awake to the demands and necessities of the trade, and reaching more favored points at tide-water than either the Baltimore & Ohio Railroad or the Chesapeake & Ohio Canal, it would appear that, without some heroic action on the part of the carriers from that district, its business must continue to decline. Already the Delaware River, New York Harbor, the Hudson River, and three fourths of New England have been appropriated by other districts, and the prevailing competition is closely contesting the limited area to which the trade of this region is now restricted.

Vessels have been extremely scarce at all shipping points and freights have advanced.

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